

MARCH
27—1913

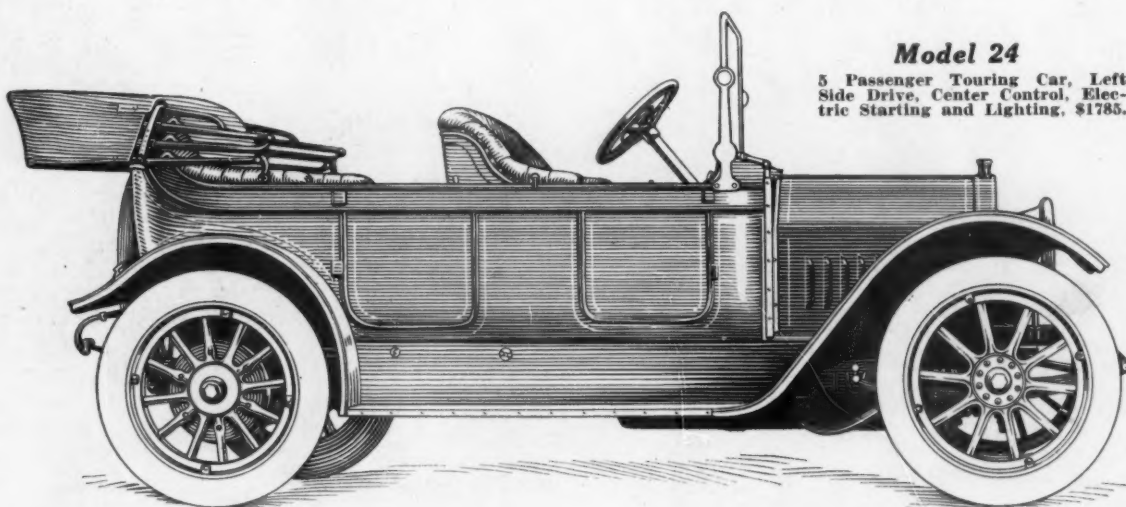
MOTOR AGE

PRICE
10 CENTS



ARTHUR
LITTLE

We can give early deliveries of all three new and splendid models of America's First Car. The best of values, fair-square prices, backed by 20 years of dependability.



Model 24

5 Passenger Touring Car, Left Side Drive, Center Control, Electric Starting and Lighting, \$1785.

HAYNES

Model 24—5 passenger touring car, \$1785

Model 22—5 passenger touring car, \$2250

Model 23—Haynes "Six," \$2500

The Haynes is a value that we can stand behind. It's the kind of a car you want. It's the kind your trade demands.

While you're selecting a line, pick a **certainty**. Twenty years of success are a guarantee of **satisfactory service** from the Haynes.

Does such **assurance** go with other cars at Haynes' prices?

Haynes standards are high, and Haynes prices are low: Isn't that the combination you seek? We make no charge for the prestige of the name.

Here are three good models, two splendid "Fours" and the sensational Haynes "Six." These three will meet your every demand.

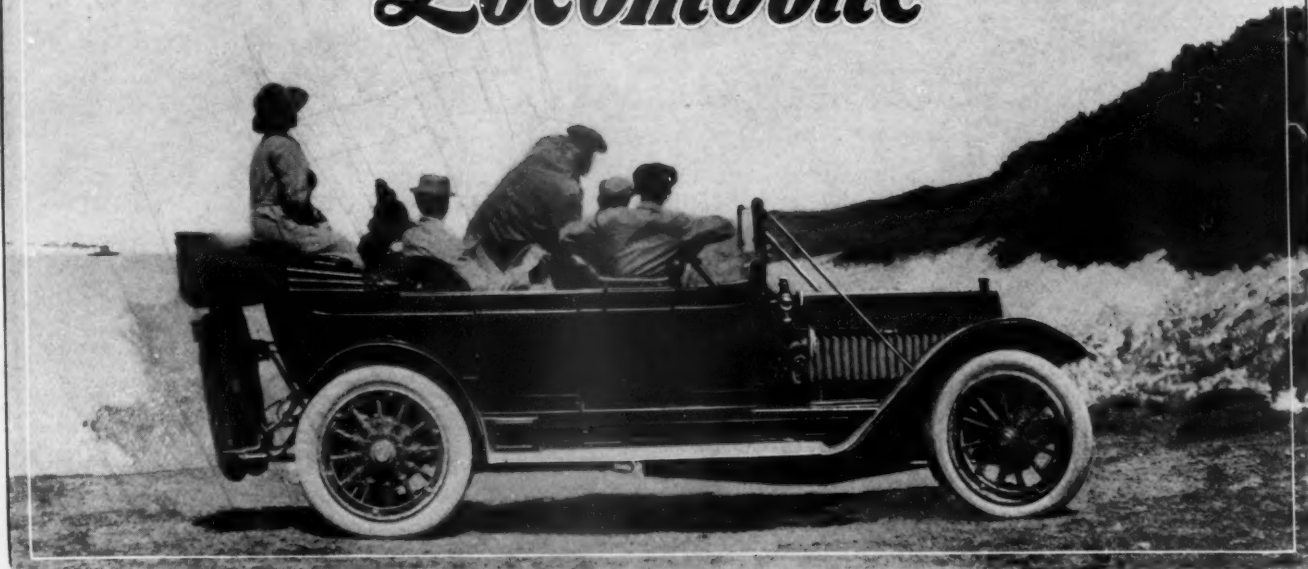
All Models Completely Equipped, including Leece-Neville Separate Unit Electric Starting and Lighting System.

HAYNES AUTOMOBILE COMPANY

501 Union Street

Kokomo, Indiana

Locomobile



The Best Built Car in America—a fact that we can prove to you, if you will give us the opportunity

TAKE the few high-grade cars in the country. The Locomobile is admittedly one. It has gone ahead faster than any of the others in the past few years. Compare each of the other cars with the Locomobile for Comfort, Economy, Equipment. Compare them for Materials, Appearance, Finish—for any other point you can think of. Insist on demonstrations that will take you a long distance over a great variety of roads. On such a competitive test as this the Locomobile will show its superior quality.

Ten-Inch Upholstery: Every Mile a Luxurious Mile

The farther you go in a Locomobile, the greater the variety of roads you travel over, the more you realize how much real comfort and enjoyment you can take out of automobiling.

You get such comfort in no other car. It is the result of Locomobile ten-inch upholstery, something no other high-grade car has.

Locomobile owners frequently tour from 250 to 300 miles a day without fatigue.

When you drive a Locomobile you do not have to slow down for bad roads. Free-acting springs and perfect balance eliminate shocks. You can maintain good speed without discomfort and without strain.

Best Electric Starter and Most Expensive Electric Lighting System

Hardly anyone thinks of buying a high-grade car now unless it has an electric motor starter. The Locomobile starter is as reliable as the motor on which it is used.

It has Locomobile quality. Foremost experts in electrical appliances say it is the best installed of all electric starters.

In combination with the best electric motor starter we use the most expensive electric lighting system.

Twelve Years Without a Broken Engine Bed or Gear Case—These Are Just Examples

You never heard of a Locomobile axle breaking or of other mechanical parts going wrong. We use chrome nickel steel

for frame and springs; engine bed and gear case of bronze. This is an indication of the unique factor of safety all through the car.

Beauty Alone Has Sold Hundreds of These Cars

The Locomobile has a trim, neat appearance. Spare tires at the rear give clear running-boards, making it easy for women to get in and out. Hinges and handles are concealed. Nothing breaks the smooth, even body surface. Body lines blend perfectly into the cowl dash.

How Locomobile Luxury Was Developed

For two years the Locomobile has been developed for the comfort, satisfaction and convenience of women. Our Ten-Inch Upholstery, an exclusive feature, was developed by women. Women tested this final touch of luxury in every way—took long tours, sat in the car, made suggestions that were incorporated into the design and finish. In this way the limit of comfort was reached.

Now there is no feature of convenience or luxury for women that is not built into the Locomobile.

Popular Features the Public Demand

Electric Motor Starter, Four-Speed Transmission, Drive through Distance Rods—not through springs—Multiple Disc Clutch, Seven Bearing Crank Shaft, Full-Floating Rear Axle, Bronze Engine Bed and Gear Case, Chrome Nickel Steel Frame and Springs, combined only in the Locomobile.

The Locomobile Company of America, Bridgeport, Conn.

MOTOR CARS AND MOTOR TRUCKS

When Writing to Advertisers, Please Mention Motor Age.

Any Manufacturer Can Test The Hartford Starter Without Redesigning His Car

With most electric starters the car manufacturer is beset with the difficulty of altering his car's design to try them out.

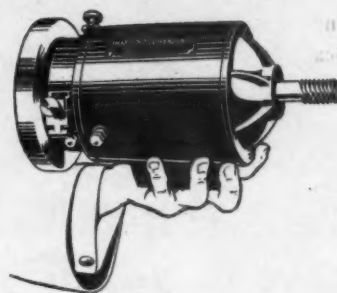
This difficulty has been entirely overcome in the Hartford Electric Starter, which can be successfully applied to any car in use without a single structural change. The wonderful compactness of the Hartford Starting and Lighting System makes this practicable.

While our buyers are clamoring for lighter weight cars, they are also demanding electric starter equipment. In the case of many manufacturers this has meant an increase in their car's tonnage, which has produced an under-tired car.

Consequently the demand of manufacturers, designers and engineers is for a starter that is of proven efficiency, yet of extreme light weight.

It remained for Mr. E. V. Hartford, the inventor and designer of the

Hartford Electric Starter



to couple the greatest power with the least weight and offer to manufacturers an electric starting and lighting system which is light, powerful, silent and trouble proof.

No manufacturer is asked to take these claims for granted.

We should be glad to extend you the service of our special installing department which will assign an engineer to attach and demonstrate this system on your car, or you can put it on yourself. Catalog on request.

Every Buyer Should Specify the Hartford Starter for His New Car

HARTFORD SUSPENSION CO.

EDWARD V. HARTFORD, Pres.

Office and Works: Jersey City, N. J. Dealers Everywhere Offices in all Principal Cities

Makers of the Truffault-Hartford Shock Absorbers

MOTOR AGE

Published by the
CLASS JOURNAL COMPANY
910 South Michigan Avenue
CHICAGO ILLINOIS

Volume XXIII

MARCH 27, 1913

No. 12

Contents

WANDERLUST THAT LED AROUND THE WORLD.....	5
Interesting account of globe-girdling motor tour made by an American, Melvin Hall, and his mother	
AUCTIONEER'S HAMMER ECHOES WORLD'S RACE ROMANCE....	10
Sale of Thomas champion and New York-Paris trophy recalls great endurance test	
EDITORIAL—LET ALL USERS PAY THE BILL.....	12
FLOODS AND TORNADO AFFECT INDUSTRY.....	13
Storms in Iowa, Indiana and Ohio felt by motor car manufacturers	
BODY IDEAS FEATURE BOSTON SHOW.....	14
Description of novelties on display in truck exhibition at the Hub	
RATES TOO LOW FOR GOOD SERVICE.....	16
Railroad officials answer complaints of Detroit motor car manufacturers	
HOLDS LIST PRICES MUST BE MAINTAINED.....	17
Washington court rules on case involving sale of patented articles	
SWEDISH HONORS FOR AMERICAN CARS.....	18
Overland makes fastest time in hill-climb and is second in its class—Hupmobile, Pope-Hartford, Cadillac and Hudson make perfect road scores	
CYCLECAR ONE OF DEVELOPMENTS OF 1913.....	22
French pioneers in movement—England offers ideas—America's efforts	
ACCESSORIES DESIGNED FOR TRUCK USERS.....	26
Commercial vehicles bring about demand for different sundries	
NEW KEETON SIX OF EUROPEAN TYPE.....	42
Description of 1913 line	

DEPARTMENTS

Routes and Touring Information	24	Coming Motor Events.....	39
Readers' Clearing House.....	30	Among Makers and Dealers....	40
Motorists' Kindergarten.....	36	Motor Car Repair Shop.....	41
Housing the Motor Car.....	37	Development Briefs	43
From the Four Winds.....	38	Brief Business Announcements..	44



WHITNEY CHAINS
ARE BUILT FOR STRAINS

WHITNEY CHAINS
are the most practical
for motor vehicles.

They can be distinguished by the presence of cotter pins, which means that every WHITNEY link is quickly and easily detachable for the lengthening, shortening or repair of the chain. An ordinary screw driver or a pair of pliers will do the trick in a few minutes.

Made from steel, calculated to resist the greatest wear.

Our illustrated catalog shows top and side views of our roller chains. Write for it.

The Whitney Mfg. Co.
HARTFORD, CONN.



The Tire Tale, Told *by the* Speedometer

How many thousands of miles of uninterrupted service—how many miles total to divide into your maintenance and original cost to get the tire cost per mile?

Here is where Walpole "No Stone Bruise" Tires do their shining. Not in promises, but in actual per mile cost as figured out from the records kept by your little mile-marking machine on the dashboard.

Their record is possible because Walpole Tires have extra mileage and extra service put into them in the making. They have **extra heavy side walls** and **extra heavy tread** which prevent stone bruise, guard against blow-outs and withstand more miles of grinding wear.

Walpole
"NO STONE
BRUISE" **Tires**

are planned to be the tires of the future, to increase tire efficiency and reduce cost to new standards. They have made good, even better than we had hoped for, and stand today as the best tire investment any motorist can make.

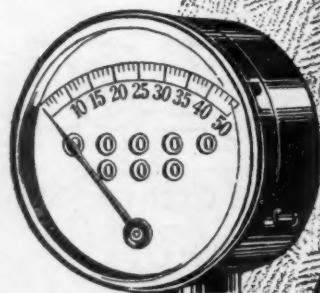
We should be glad to place facts and figures before you on request.

Walpole Tires are made in both plain and Bailey treads and are handled by live dealers.

Walpole Tire & Rubber Co.

757 Boylston St., Boston, Mass.

Factories at Walpole and Foxboro, Mass., and Granby, Can.



MOTOR AGE

Zigzag roads which wind thousands of feet high over the peaks of the Swiss Alps, and which stretch like white rib-below. Such winding roads as this seldom are found outside Europe, where road engineering skill has been highly developed

Wanderlust That Led Around the World

Adventures of Melvin Hall in Globe-Girdling Tour



By L. V. Spencer

TO ramble completely around the world in a motor car is an enviable form of wanderlust. When Mrs. William A. Hall and her son, Melvin A. Hall, drew up at their home in New York last January in a weather-beaten Packard, which was besmeared with stickers of hotels from London to Hong Kong, they had driven a distance of some 40,000 miles, through thirty-two European and oriental countries.

They had begun the trip with no idea of extending it beyond a summer tour in Europe, but the old world, with its numberless records and fascinations of the past beckoned, and they wandered here and there as their fancy led them, never knowing save in a hazy way when they set out each day where their fall would find them.

Tour an Adventuresome One

Before they again were driving on the smooth asphalt of New York's Fifth avenue they had made their car plow through pathless deserts, under the scorching sun; crawl up appalling grades into snow mountains; and endure innumerable rough handlings in loading and unloading with inadequate ships' tackle. "The car had fallen through frail bridges; been towed by water buffalo through rivers so deep that the cushions were soaked; clogged with clay and mud and stood day and night in tropical downpours," to use Mr.

Hall's own words. Not content with this journeying, they had driven across the American continent in the middle of the winter, a most remarkable feat.

For the most part of a year the car found no shelter, the oriental countries and many parts of Europe offering no such thing as a garage. The Halls wore out 118 tires, burned up some 5,000 gallons of gasoline, and spent 18 months in doing it. In addition to the long land tour, some 11,000 miles were covered by water, the car being shipped as best it could under existing circumstances each time.

Mr. Hall is a young man of some 24 years, though a seasoned traveler. With an itinerary developing wholly as it progressed, mother and son went from country to country, from stolid England to romantic Italy, from the desert



Among the cocoanut palms of the Stimonan road, Tayabas Province, Philippine Islands

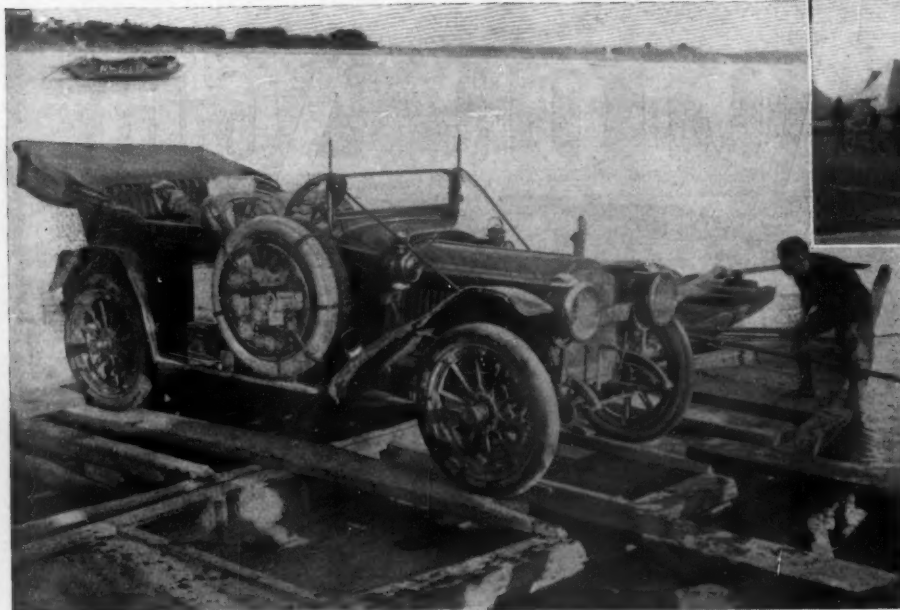
wastes of India to the fascinations of Japan. Incidentally no mechanical delays marred the tour.

To add to the features of the wonderful tour, the Halls witnessed the coronation of King George V; took in the Durbar at Delhi; viewed the funeral of Japan's emperor and were in Japan when that country suffered one of the worst typhoons of its history.

Seeing Europe

Teeming with adventure, Mr. Hall's own impressions and reminiscences of his world trip are worthy of our "best sellers." Few motorists cover Europe as did Mr. Hall. Penetrating to remote places and seeking roads little frequented by the average motorist, he "did" Europe thoroughly.

The little party of two set sail from New York for



Not an American ferry, but the best equipped ferry in Japan, at Tonegawa. The Americans were glad to use it



Entrance gateway of the Burma camp at the coronation, Durbar, Delhi, which was one of the sights seen by the Halls

Forelaz, into which we wandered by mistake, with its steep, unprotected corners shelving off into 1,000 feet of space, with 4-inch margins between the rear wheels and unpleasantly crumbly edges to the summit of the 9,100-foot Stelvio, the highest pass in Europe, 1,500 feet above the level of perpetual snow."

The young traveler declares that the next most beautiful section is the famous Corniche road, along the Riviera, although during the season it looks for all the world like one of America's own speedways, so thickly is it dotted with motor cars.

Down Adriatic Coast

"Rather unusual was the run from Venice down the coast of the Adriatic and through the extremely picturesque and provincial Balkan states. The people retain their elaborate and gay-colored native dress, which adds a romantic touch to the scenery, with its romantic ruins and the remnants of the ancient powers of Venice," Mr. Hall tells us. "The costumes of every village differ in their brilliant gorgeousness and barbaric splendor. The women of Dalmatia, with their full embroidered skirts, fancy jackets and aprons, long braids of black hair and huge

Southampton in June, 1912. On securing their car, which had followed them by another boat from New York, they toured to London, taking a short trip over the beautiful roads and charming scenery of England and Wales. Later they crossed to the continent and penetrated every country on the mainland of Europe except the four extremes—Portugal, Norway, Russia and Greece. They went from the sunny vinelands of France to the mountainous passes of Switzerland and up and down the coast of the Adriatic.

No Monotony on the Tour

"Many years of motoring in Europe have failed to make any of it monotonous," says Mr. Hall, "except perhaps the rough pavé of some parts of Belgium, but even the inimitable charm of Holland with its bricked roads bordering the canals and its picturesque horizon of long-armed windmills, the straight poplar-lined

highways of France, Germany's beautiful Rhine valley, the spas of the Pyrenees, and all other parts of the continent, must yield to that section which includes the Swiss Alps, a portion of the Italian lakes, and the Austrian Tyrol and Dolomites, wonder spots of Europe.

"Nowhere else in the world can offer such roads through such scenery. We became obsessed with mountain passes and zigzagged all over those gorgeous peaks, crossing passes merely to return by others, crawling straight up thousands of feet and down again for the pure fascination of it. We explored practically every pass in Europe, from the vicious little Col de la



Batak market, Negere, Tonnging, Sumatra, and some native women



Through the Kandugannawa pass to Kandy, Ceylon, which was on the route followed by the Packard



Evidences of the great typhoon in Japan. A road washed out near Nagoya, which occasioned considerable delay

silver belts and necklaces, somewhat resemble North American Indians."

Mr. Hall found the roads of the Balkan states generally well-engineered, but with a very narrow track, one pair of wheels always running on the loose sharp rock on the edges, a bad enemy of tires. These roads stretched out sometimes over picturesque mountain passes, sometimes through barren rock wastes and again creeping down along the seashore, or high up in the cliffs at its edge.

In Picturesque Dalmatia

Mr. Hall's description of a first view which they had of picturesque Dalmatia is a particularly graphic one:

"Our first glimpse of Dalmatia," he says, "was a spectacular one; a long gradual climb through dense woods suddenly terminated in a great round crater-like bowl of barren rock, with a few cave huts at intervals, a group of peasant girls in flaming red and silver, spinning on hand distaffs, huge stone boundary post beside the road with its single word, 'Dalmatia,' and, high above, balancing on the top-most pointed crag, a shaggy goat outlined against the sunset, looking down at us. It was wild and mysterious, and later on we must have added to the mystery our-



Here a road was completely blocked by two large boats blown up from the river. This made necessary a wide detour

selves, for descending the pass we came to a fine straight road into Zara and followed it at high speed in the full glare of acetylene lights while the amazed peasants ran out from their huts and stared wonderingly at the ghostly thing flashing by with two enormous eyes and a great white tail of dust."

Bearing on down the east coast of the Adriatic, the car left Dalmatia with the intent of making 174 miles on that particular day's running—a rather extended journey even in our own country. The party was destined to increase its trip to 211 miles on this day, "due to the vaga-

ries of the language," as Mr. Hall puts it. They were heading for Ragusa, which happens to be spelled "Dybrovnik." Misunderstanding natives directed the tourists far enough in the wrong direction to exhaust their gasoline tank, the fuel supply of which already had been nearly depleted by nine hard mountain passes. The night was spent in the car half way up the tenth pass, the two making themselves as comfortable as they could under the circumstances. Now and again the stillness was broken by shepherds attempting to drive their flocks past this shadowy, but still, monster. "A wish of breathing, some Slavic oaths and blows, then a scurry of hoofs, and another flock had passed in the night."

Long Walk for Gasoline

In the morning Mr. Hall was obliged to walk 14 miles to a certain china shop in



In Hamamatsu, Japan. Typical crowd which usually turned out to see the car in the Oriental countries. In this case onlookers are held in check by police



A street in Shanghai, with its queer stores, impossible signs and characteristic narrowness



It is seldom that the motor car disturbs the majestic silence of this avenue of young royal palms in the gardens of Ceylon

the next town, the only place in that habitation where gasoline was sold.

The trip from Ragusa to Montenegro is described by the tourists as being one of the grandest in the whole world, including a little yachting across the beautiful Bocche di Cattaro on some planks laid over one small sailboat and assisted by a row boat of most unstable design. This particular ferry contrivance, which was one of many that the party was destined to use ere it again reached American soil, took 3 hours to prepare.

One minute the road follows the sea and the next the car is lost in the mountain passes of the very white Black mountains, which rise sheer before one, with the road etched in the steep sloping sides.

Marvelous Montenegro View

Finally winding its way over the mountain barriers, the road descends into Montenegro with many undulations and turns, on one of which the party was obliged to reverse from one to three times. "All the trouble of negotiating the steep climb is repaid by the marvelous view at the top," says Mr. Hall. "On one side lies the Bocche with ranges of mountains encircling, and the Adriatic beyond. On the other the rocky, barren, but splendid little kingdom, where all the men are soldiers and wear their picturesque national costume, and stand to salute the stranger as he passes. We then proceeded to Albania, where the mountains were full of starving refugees from the Turks, but could go no farther for there the roads end."

On the return the Halls motored down the other side of the Adriatic through the hill towns of medieval Italy, each mile revealing fascinating fortress cities with walls and towers and splendid cathedrals

all perched on the very tops of inaccessible peaks.

The roads of southern Italy are very bad, although those running nearly to Rome are in good shape. Even the Amalfi-Sorrento drive around the Sorrentine peninsula has deteriorated badly, despite its great beauty.

India Is Invaded

Having virtually crossed Italy on a leisurely diagonal course from the Adriatic to the Tyrrhenian sea, the Halls piloted their car on down to Naples, there to ship it by water to Bombay, passing eastward through the Suez canal and on to Indian shores.

Some difficulty was experienced in obtaining passage for the car, but young Hall had made up his mind that it must go. Reaching Naples it was found that

the boat on which the car was to be shipped had been requisitioned for the war. However, there was one other vessel which would reach India in time for the Durbar, this event now being the goal of the world wanderers. This ship was due to leave in 24 hours and it looked like an impossible feat to get the car on board, due to the exigencies of having a case built in 1 day.

To add to the young man's troubles the king came down from Rome to bid farewell to his troops bound for the conflict, and the harbor was closed to everything but the transports. Not to be outdone, the Halls hired a floating crane, and a tug towed it out to the ship, the car being transferred to its deck in the middle of the Bay of Naples. "The last I saw of her she was steaming off on the horizon, guided by a great line of Italian battle-ships and transports," said Mr. Hall.

Arriving in Bombay, the party motored directly to Delhi for the Durbar. That event over, several short excursions were made from the Indian city. Mr. Hall's account of one of these is particularly interesting:

To Delhi for Durbar

"From Delhi we took a side trip down to Jaipur and across a portion of the Rajputana desert. In Delhi we were informed of a road to Jaipur, 'not very good, but passable.' It was just that for 20 miles, then it ended in a bullock track up a river bed. From here on, we labored through the untamed desert-sand dunes, soft sand, hard sand, drifted sand, sand that clutched and clung, sand that swirled and blocked. It was desperate work, with the car fighting every inch at its lowest speed.



Chinese people of wealth do not travel in motor cars. The Chinese method of conveyance in Canton, which is still in vogue. The illustration also gives a view of the famous wall

"At times we would stick hard and fast in a drift and wait for the inevitable crowds to gather. In any spot in India, even in the desert without visible habitation, crowds seem to rise from the soil on slight provocation. In 1 day we made the magnificent total of 14¾ miles.

Entertained by the Nawab

"The first day out of Delhi we reached Patoudi with a bodyguard of eight coolies whom we had hired to follow us. One acted as pilot, for none but the desert-born could have found a trail. Patoudi doesn't boast of much besides mud huts and the nawab's palace, and we were seeking a nice broad tree to sleep under when a stately Mohammedan, in a blue robe and turban, extended an invitation from his master, the Nawab Mahomet Muzaffa Ali Khan Bahadur, to occupy his guest house. We spent the night in a charming bungalow, in the midst of beautiful gardens, where the car was guarded by special policemen.

"The desert and jungle were filled with fascination. Almost constantly in sight were large herds of black buck and a small Indian deer. Great grey apes loped alongside and stared curiously. Swarms of little brown monkeys swung and chattered, big wild peacocks flashed across the road."

Later the daring Americans went north to Peshawar, passing north to British India by the Grand Trunk road, 1,450 miles from Calcutta. This road generally is well-marked, but during the rainy season when the broad Indian rivers, which are generally quite dry, become uncontrollable torrents, the highway is blotted out and becomes only a sand waste. Usually travelers must seek the help of a score of natives to aid in piloting their machines,



The native primitiveness of Sumatra is revealed by this view, which shows the women weaving and dyeing sarongs, in Kampong, Kinalang

across these recently inundated tracts of country.

"From Peshawar the car was headed southeastward, almost bordering on Tibet and the Himalayan mountains, finally wending its way to Calcutta on the southern coast. Tibet is forbidden to the motorist. Throngs hurrying along the great highway toward Magh Mela, the greatest Hindoo festival, celebrated in its entirety every 12 years, when all who desire special holiness make pilgrimages to the sacred waters of the Ganghese and Jumna rivers, were passed. From Calcutta the car was shipped by water to Ceylon, the roads there being surprisingly fine. The young traveler characterizes Ceylon as a paradise for motorists.

"In a single day one may run from the wonderful Kandy hills, over the tea-cov-

ered upland of Nuwara Eliya, 6,000 feet high, down to the palm-fringed south coast, where the old laterite road stretches for 150 miles through unbroken cocoanut groves, along the very edge of the Indian ocean, where the waves break in a line of white surf on the narrow, indented beach."

Later 6 weeks were spent in Java, where many splendid roads were encountered and about 2,000 miles of touring put to the car's credit. From Java the machine was transported to Sumatra by the water route. The stay on this island proved to be rather unpleasant, 17 days of rain being encountered, with its attendant discomforts. The roads were made heavy and nearly impassable, resulting in frequent miring of the car. Wheels wrapped with heavy chains whirled about at high speed, while the car moved sideways, throwing mud in all directions. Speaking of this experience, Mr. Hall said:

Mired in Java Mud

"Whenever I jumped out to throw grass under the wheels, I sank in the mire and floundered helplessly. Eventually we fell through an innocent looking bamboo culvert, and the rear end of the car sank until our trunk was invisible. I could hear the shouts of a few natives scaring the birds away from their grain, and walked over to them, but to my weak efforts in Malay they merely stared in silence. But from there I could see two solitary little white houses, a mile away. They proved to be the station of the Dutch comptroller. The courteous official loaned me thirty-eight prisoners under two armed guards. With long poles they pried the car out, building up the road underneath.

"Three times more during our trip we were buried in the mud. Once we aban-



In La Union Province a salsa is used for ferry purposes. When the car was driven on it, it sank below the surface



doned the car at night and walked 5 miles in the dark and pelting rain."

Considering themselves well out of this adventure and making their way to the coast, the car was shipped to Singapore, where some little touring around that city was undertaken. This, the principal seaport of the Straits Settlements, affords little attraction as a touring center, and while there are some good roads, they usually were found to lead nowhere in particular, usually ending abruptly some 80 or 90 miles from the city.

Saigon, Cochin China, was next visited, being reached by boat from Singapore. Here, too, much the same road conditions existed as in the latter city and they soon left for Hong Kong by steamer. This city offers little or no touring and hence it was quickly abandoned by the wanderers, who next went to the Philippine islands.

Next Visit the Philippines

The Halls were quite taken with the touring advantages offered by our dependencies, particularly the island of Luzon, and besides covering all the beaten paths of this island, many stretches were negotiated which previously had been regarded as impassable to the motor car. In the mountain province, the Naguelan trail was negotiated. This is a narrow saddle path skirting the edge of the cliffs.

It perhaps was due to the fortunate meeting with the head of the department of public works, who was at the time of the arrival of the Halls just setting out for a tour of inspection of all the island roads and passes, that the tourists owe their appreciation of the islands' touring advantages. Had they arrived at any other time they could not have hoped to take in the many little-known roads that they did. Each of the islands was visited, with the car carried from one to the other on the forward deck of a small coasting steamer.

Sometimes quaint rafts had to be constructed by the natives to transport the big car over streams of no mean depth. Once when the car was driven on a raft, its weight proved enough to force the carrier below the water level, the car standing "knee deep," as it was slowly moved across the river.

Tiring of the Philippines, the Halls proceeded by water to Shanghai, where they found very little motoring possible. Here, too, the roads are good as far as they go, but they do not go far enough. They lure one out for a dozen or more miles and then end abruptly, with a flight of steps, a rocky cliff, or what not.

From Shanghai the car was taken to Kobe, Japan. It was in Japan that the only really narrow roads were encountered and when the size of the car was a disadvantage. The very narrow roads, though in good condition, make the passing of vehicles impossible, and on many occasions it was necessary for the big car to go back for several miles in order to afford room for other vehicles to pass. The houses, too, encroach upon the highway, and it was often necessary to put down the top in order to get through. The turns also are very sharp, making the going slow, if not hazardous.

It was while the car wandered through Japan that they encountered a typhoon. Melvin Hall's description of its effects is of interest:

"It really is unfair to judge the usual motoring conditions in Japan from our experiences immediately after a big typhoon. In 1 day's run from Nagoya to Shizuka, we lived a chapter of vicissitude. The first delay was caused by two large boats which had been blown up into the road by the storm. Returning in another direction and eventually finding our way around, we kept on through a maze of fallen trees, tangled telephone wires and wrecked houses.

Caught in Trap on Bridge

"After some 65 miles the road ended in the large lagoon of Hamana-ko. We progressed some miles on a narrow road which skirted the lagoon, and cautiously crossed numerous little bridges. It was not long, however, before one that appeared stronger than the rest trapped us. As the front wheels crept on to it, it did not break, but simply withdrew and dropped the front of the car some 8 feet below. The strenuous efforts of forty coolies for several hours enabled us to escape."

During that typhoon, the roof of the very hostelry in which the two were stop-

ping was blown off, while it was only due to the fact that the car was carefully boxed and housed over with planks in the courtyard that damage was not done to the trusty vehicle which had brought them so far. Proceeding after the great storm, devastation was encountered everywhere and the destruction was almost incomprehensible.

The tourists yielded to the fascinations of the eastern empire and from Kobe they journeyed over to Nagoya, thence to Shizouka and around the Suruga bay to Numazu. They yielded to the fascinations of the queer, yet beautiful, islands with their obliging little people.

The sight of the big touring car running along the miniature, ribbon-like roads never failed to bring forth crowds of natives in this, as it had in other countries. Wherever a stop was made, immediately a crowd of the curious, which seemed to spring from nowhere in an incredibly short time, surrounded the machine, often necessitating the services of the police to clear the way ahead. From the Japanese empire, the tourists and car shipped directly to San Francisco, and after the machine had been slightly overhauled, the youth and his mother journeyed, once more on American soil, down to Los Angeles.

On American Soil Again

Then it was early winter and big snows in the middle west threatened. Undaunted, the pair set out from Los Angeles for the last lap of their long trip over the Santa Fe trail. On the day before attempting to drive their machine from Los Angeles to Yuma, warnings were sent out by county officials who had just returned from a round trip, having tried unsuccessfully to pass through both the Brawly-Mammoth Wash road and the Colville route through the sand hills. Nevertheless the Packard was piloted across the Mammoth Wash without delay and later wended its way by the southerly route through San Diego, Phoenix and Albuquerque to Santa Fe; then on through Las Vegas, Trinidad and Pueblo to Kansas City, over the new trail. Bearing easterly, the cities of St. Louis, Indianapolis, Columbus, Pittsburgh, Washington, Baltimore and Philadelphia were visited in completing the long journey back to the starting point.

Auctioneer's Hammer Echoes World's Race Romance

By J. C. Burton

A PATHETIC romance was staged at Buffalo last Saturday afternoon, a romance in which three inanimate objects—a proud but battered motor car, a tarnished but prized trophy and an auctioneer's mallet of wood—played the leading roles.

Five years ago the motor car, its body bright with fresh blue paint, its engine sounding a strident challenge to the five defenders of European mechanical genius—the deDion, Moto Bloc and Sizaire-Naudin of France, the Protos of Germany and Zusto of Italy—purred petulantly in Times

square, New York where a surging crowd of 250,000 had gathered to witness the start of an international dash across three continents, an unprecedented struggle that was destined to put the efficiency of machine and the nerve of man to the supreme test.

Five years ago the trophy, patterned by the hands of a master designer and paying a resplendent tribute to the energy of an unknown polisher, arrogantly reflected the subdued rays of a winter sun and attracted

haughty boulevardier and humble bourgeois to the window of *Le Matin*, the Parisian newspaper whose publishers, co-operating with the owners of the New York Times, offered the bauble of gold as a prize to the first car entering the French capital after racing across America, Asia and Europe.

Assets of small intrinsic value but cobwebbed with sentiment and historical interest, the Thomas champion and the around-the-world trophy last week were put on the block and knocked down to the highest bidder along with the patents,



FOLLOWING TRANS-SIBERIAN RAILWAY

good will and stock of the defunct E. R. Thomas Motor Car Co., a pioneer concern spurned by fickle Prosperity. They were given the place of honor at the receiver's sale. The thudding hammer of the auctioneer rapped for them last.

Five hundred dollars bought the two proud relics of American motoring history, C. A. Finnegan of Depew, N. Y., who purchased most of the other assets of the Thomas company, bidding \$200 for the car and \$300 for the trophy.

Story of the Race

It was 11 o'clock on the morning of February 12, 1908 that the Thomas car set out on a hazardous trip of approximately 21,000 miles, a nerve-racking, heart-breaking journey in drifting blizzards, swirling storms and driving rains, a tiring ride through mud, water, snow and sand, a Homeric battle with mountain ranges, parching deserts and unbridged rivers that tested the endurance of the contestants and conquered four of the five cars which answered the challenge of the indomitable Thomas.

Five months and 18 days later, at 8 o'clock on the morning of July 30, the Thomas chugged through the Arc de Triomphe and swept through the crowded boulevards of the city, escorted by a great cavalcade of motor cars.

Four days before the German Protos had staggered into Paris but it was not an entry of triumph, for the Teutons, after shipping from Pocatello, Idaho to Seattle in order to avoid 1,100 miles of the worst roads on the American continent, announced that they no longer would continue as contestants. Two French starters, the Moto Bloc and Sizaire-Naudin, also arrived before the Thomas but on a transatlantic steamer, the Sizaire-Naudin drivers abandoning the race at Red Hook, N. Y., and the pilots of the Moto Bloc giving up the struggle at Cedar Rapids, Ia. The exhausts of the Italian Zust and French de Dion were still popping with shame on the borders of Russia when the Thomas completed its trip.

Traveling 13,341 miles on land under its own power and averaging 152 miles per day, the Thomas champion had made the fiction of a dreaming Jules Verne a reality. Ploughing through deep snows, mud and swamps; plunging into gullies and jumping ditches; climbing mountains, fording swollen streams and bumping over crossties, the



LANDING AT VLADIVOSTOK

Thomas set the pace in that mad race and crossed the American continent in 42 days, with the Zust and de Dion trailing 12 and 14 days behind, respectively.

From San Francisco, the Thomas crew sailed by way of Seattle to Valdez, going to Alaska to comply with the rules of the run which originally scheduled a trip from Valdez to Nome as the second leg of the journey. The trails of the gold-hungry were found impractical for motoring and the Yankee drivers reshipped to Seattle and there took passage for Japan after being notified that their rivals had abandoned any idea of attempting the ride across Alaska and had already departed for Vladivostok.

Passing through Japan

After a voyage of 4,285 miles on the Pacific ocean, the Thomas crew disembarked at Kobe and the blue car sounded a challenge in the land of the jinrikisha. Over roads so narrow on the mountains that only a few inches were left between the wheels and precipices and ravines, the Thomas traveled 350 miles across Japan to Tsuruga and there was once more loaded on a boat and shipped to Vladivostok.

In the chase after the foreign cars, the Thomas covered the 8,280 miles between Vladivostok and Paris in 49 days, running time, a daily average of 169 miles. At Vladivostok, one of the competitors cornered the gasoline market and detained the American car 3 days. The 450-mile trip between Vladivostok and Harbin was made on the crossties which were wide apart and unballasted, the car having to run fairly fast to keep the wheels from locking between the ties on the outside of the rail.

Seventy-two days of terrible privation were spent in trackless Siberia where the Thomas crew not only had to eat poor food but go without water and sleep 67 nights of the 72. The roads of Siberia were too narrow for the tread and at no time was the car, carrying two barrels of oil in addition to its regular load, in the track.

Gradually gaining on the Protos and passing the other contenders, the champion raced through St. Petersburg, across the German border to Berlin and on into France, to win a trophy emblematic of world's motor car supremacy, and to be toasted by the mayors of Paris and New York and complimented by the president of the United States.

E. R. THOMAS AND NEW YORK-PARIS TROPHY

TO THE THOMAS CHAMPION

*Who wants to buy an antique motor car,
With body bent and marked by service scar?
Its heart is weak, it will not work for you;
Its days of usefulness are done, that's true,
But underneath the battered hood of blue
There's something hid our sentiments to jar.
Going-going-gone!*

*Five years ago its throbbing sent a thrill
Through all the world: On frozen plain and hill
It bucked the barriers of blinding snow,
Defied the gumbo bog and desert blow,
And plunged through space where others
Dared not go;
Today the once-proud engine's voice is still.
Going-going-gone!*

*Across three continents it dashed supreme
And roared defiance at the scollen stream,
The white-capped mountain range and track-
less plain
In raging blizzard, sand storm, pelting rain,
To prove that Yankee grit is not in vain
And shatter into bits proud Europe's dream.
Going-going-gone!*

blue machine, taken from stock 6 days before the start and pitted against vehicles especially constructed for the contest, had proven the supremacy of the American motor car and carried the stars and stripes in triumph around the world.

Thomas Only Finisher

It was a wonderful, a spectacular achievement. The only car to comply with the rules and to follow the official route, the Thomas covered 3,836 miles from New York to San Francisco in the worst season of the year with the mercury in the thermometer flirting with zero and the roads covered with the deepest snows for miles. Snow was not the only obstacle in the dash across the United States. There was the gumbo mud of the middle west, the frozen mountain ranges of Colorado, the deserts of the southwest. The



MOTOR AGE
Published Weekly by
THE CLASS JOURNAL COMPANY
910 SOUTH MICHIGAN AVENUE CHICAGO

NEW YORK OFFICE
239 West 39th Street

SUBSCRIPTION RATES
United States and Mexico
\$3.00 per Year
Other Countries including
Canada \$5.00

Entered as Second-Class Matter September 19, 1899, at the Postoffice at Chicago, Illinois, under Act of March 3, 1879

Let All Users Pay the Bill

THE present session of the various state legislatures is productive of a greater crop of motor legislation than has been introduced during any previous year, and the majority of the new bills have been introduced either to increase the state revenue or eliminate to an extent accidents.

ALTHOUGH few of the introducers of these bills have stated the object is to give increased revenue, this fact has nevertheless been acknowledged by legislators in inner political circles; and in nearly every case the public statement carries the impression that the increased revenue is needed for the maintenance of the roads, whereas, as a matter of fact, in several states not a single cent of the registration fees to date have gone to such a fund, but rather they have been consumed through the devious channels of political finance, or held in abeyance until more adequate provisions shall be made for their disposal.

IT is a most regrettable state of affairs when a new industrial revolutionizing industry such as the motor car industry is, should be illegally taxed by registration fees; and it is still more regrettable that this tax levied under the guise of meeting road construction should be distributed in other channels.

THERE is scarcely a motorist but acknowledges the illegal class taxation aspect of motor registration fees when they exceed the amount required to pay for the necessary identification, but these same motorists are willing to pay an illegal fee if, by so doing, they will be furthering the general good of the motor industry. This is a philanthropic stand to take by the car owner, and state legislatures will make serious errors when they continue increasing such illegal taxes to a point beyond which the private motorist refuses to go.

THERE is scarcely a motorist paying the state registration tax but who realizes that all horse vehicles within his state are not paying a similar tax, but yet he is a sufficiently enthusiastic and progressive citizen to be willing to meet such taxation for the general movement of improved highways. Taxing the motor car because it wears out the highway, and not taxing horse vehicles for use over the same highways is unjust. *If motor vehicles wear out highways, so do horse vehicles. True, they wear them in different ways, and to different extents, but nevertheless the destruction is present in one case as well as in the other. If our legislators are to be just then there must be a tax placed on every vehicle that uses the highway. Such a tax must be graduated in proportion to highway destruction. It is impossible to accurately gauge the percentage of such tax that each type of vehicle should meet, but legislators should frame their new legislation to point in the direction of the eventual goal, and should not take that unjust course of taxing the motor car because it is a new form of transportation and let horse vehicles go untaxed simply because they have been with us for generations.*

ALL forms of vehicles using highways destroy these highways to a greater or less extent, and because of doing such should pay a percentage of the maintenance of such highways. Granted that this is so, the problem remains as to the most just method of taxation, or registration.

MOTOR AGE is in favor of taxing motor cars more than horse vehicles because they use the roads to a much greater extent. Motor Age favors a greater tax on motor trucks than on horse trucks because a motor truck can cover approximately three times as much highway as a horse vehicle carrying an equal load. Motor Age favors the regulation of the amount of load carried on motor trucks and also on horse trucks. There must be a load limit as to the weight carried on each of the four or six wheels of such vehicles. Motor Age further favors limitations being placed on the width of metal tires used on horse or motor vehicles, and also some form of rational regulation governing the speeds of different motor trucks.

IT is a fact that the combination of horse travel and motor traffic is imposing an enormous wear on our highways. It is further a fact that this combination of traffic is much more severe than would be an equal amount of either horse traffic or motor traffic. It is a fact that it is difficult today to build highways suitable for motor traffic and also suitable for horse traffic. It is further a fact that it is not difficult to build a highway suitable solely for horse traffic, or is it any more difficult to building a highway suitable solely for motor traffic. The trouble comes in the combination. The horse traffic destroys the road by the calks, loosening the surface, and the motor traffic supplements this destruction by lifting out the surface so loosened and raising it to be carried into the adjoining fields by the wind.

THE eventual solution calls for a rational survey in which the relative importance of motor traffic and horse traffic are sanely weighed. The section of the country in which such a question is considered has an important bearing on the result arrived at. In the metropolitan areas of Chicago, New York, Boston, Philadelphia, St. Louis, San Francisco, Los Angeles, Cleveland and Baltimore there is only one answer, namely, that all new roads constructed must be built to meet the requirements of the motor vehicle instead of being constructed on lines best suited to horse traffic. The metropolitan areas of Chicago and New York embrace a circle with a 60-mile radius, because business people are finding it cheaper to deliver their commodities throughout such a territory by motor truck than by loading them onto steam lines or delivering them by trolley. Naturally, if it is more economical for these business men to deliver by motor truck than by other means, these same men will be willing to pay their just share of road destruction in their zone of delivery, but they are all sufficiently acute business men to realize the unfairness of taxing their motor vehicles and letting horse trucks operating over the same highways go free. There is justice in a legitimate justly proportioned tax on all vehicles using the highways.

THERE are many examples in the country today, and in Europe also, of special highways built for motor service, and which are enduring many times longer than other types of highways developed for horse traffic. Many examples of special highways could be cited, but it is unnecessary. The one fact remains paramount, namely, that in our metropolitan areas and in territories contiguous to our great centers of population we must have highways adapted to motor trucks. Another point is that if the motor owner is taxed for the use of such highway, then all other users of the same highways must be taxed in their just proportion to their use of such.

Floods and Tornado Affect the Industry

CHICAGO, March 26—The tornado that swept across Iowa and Nebraska Sunday night, leaving death and destruction in its wake and the partial inundation of Indiana and Ohio by the floods of Monday and Tuesday, may have an untoward effect on the motor interests of the country, according to advices received here today.

The loss in Nebraska and Iowa will be shouldered by the retailer, since these two states are without the manufacturing zone. Because of the meager reports emanating from sorrow-bowed Omaha, it is impossible to learn at the present time just how many agencies were razed by the funnel-shaped cloud that struck down 500 residents of the city and destroyed property valued at \$5,000,000. Car shipments into Iowa and Nebraska have been halted temporarily.

Havoc Created in Indiana

The swollen rivers and creeks of Indiana and Ohio have exacted tribute from a score of motor car and accessory manufacturers. Dayton, Youngstown, Akron and Hamilton in Ohio and Indianapolis, Peru and Connersville in Indiana were the centers of the motor car industry flooded by raging streams.

It was impossible to communicate with Indianapolis today either by long-distance telephone or telegraph and local agents of Indiana-made cars in the majority of instances only could guess at the damage sustained by the plants. There has been very little mail received from the Hoosier metropolis this week and no shipments, as washouts have held up the railroads.

One loss is definitely known. That was suffered by the Motor Car Mfg. Co., maker of the Pathfinder, situated in West Indianapolis about ¼ mile from the White river levee at Morris street, which went out last night and submerged hundreds of homes. According to T. C. Vawter, the local agent, the first floor of the new factory, completed but 6 weeks ago, was entirely covered with water and the first assembly and stock rooms, machine shop and testing department flooded. Part of the stock room equipment was moved to

Motor Business Hampered by Unprecedented Storms This Week

the second floor before the water rose so high that it made further work impossible. The loss is not known.

As it is situated but one block from the Pathfinder plant, the Nordyke & Marmon factory also is believed to be flooded. M. E. Hon, the Chicago representative of the Marmon company, has been unable to get in communication with Indianapolis.

May Delay Shipments

The Premier, Stutz, National, Cole, Henderson, American and Waverley agents have not heard from Indianapolis for 3 days, but do not believe that the makers of these cars have suffered much from the floods. They anticipate tied-up shipments for a week at least.

It is thought here that promoters of the annual Indianapolis motor show which opened here last Monday at the fair grounds will be forced to discontinue the exhibition because of the flood. The four bridges that lead to the fair grounds either

have been washed away already or will have to be destroyed, according to the newspaper reports. Fall creek, which is ½ mile from the fair grounds, is on a rampage.

At Dayton, where the toll of the flood is estimated at 5,000 persons, it is thought that the Stoddard-Dayton factory is under water. C. A. Englebeck, of the local Stoddard-Dayton agency, has been unable to communicate with the factory, but has received word from Connersville, which was in the flood zone, that the Howard plant was not damaged. There are no shipments from Connersville, however, since the railroad bridges of the Big Four, C. and H. and D. and interurban lines have been washed out.

Speedwell May Be Flooded

S. N. Schwab, manager of the Chicago Speedwell branch, believes that the Speedwell plant at Dayton is flooded up to the roof, although he has received no word that would confirm such fears. The wide spread of the flood at Dayton and the fact that the Speedwell factory is a one-story structure almost verifies such a conjecture.

Because the factory is close to the creek that is on a rampage at Kokomo, H. E. Doty, the Haynes Chicago representative, would not be surprised to receive word that the plant is under water. J. C. Erbst, manager of the local Apperson branch, with a factory at Kokomo, has heard nothing from the makers.

The Great Western factory, located at Peru, Ind., is also thought to have suffered from the flood, although the local agent, Joseph Diebler, has been unable to communicate with Peru.

Reports from Tire Centers

The factories of the Republic Rubber Co., located at Youngstown, Ohio, are on high ground and Manager Maguire of the local branch is confident that the flood has not had an untoward effect. At Akron, O., where a huge reservoir burst, the tire factories escaped and are said to be operating, although the water has penetrated the plants. Many of the other factories have closed down, however.

FISK GAINS PATENT DECISION

Boston, Mass., March 22—Justice Hale of the United States court of appeals of the first district has affirmed the decision of the district court declaring patent No. 882561, issued June 6, 1906, to P. D. Thropp, void and invalid on the grounds of anticipation. Delaski & Thropp and the Circular Woven Tire Co. thus lost to the Fisk Rubber Co., which they had sued for infringement in the past 4 years.

The patent covers the form of mold used on cure-wrapped tread tire casings. A number of tire makers had made license arrangements with the patent owners and now nineteen manufacturers pay royalties. By doing so they have acknowledged the patent valid and it is rather a problem whether their arrangements with the patent-controlling form will be influenced by the latest court decision.

Motor Car and Accessory Concerns Located Within Storm Zone

Omaha, Neb.—Omaha Motor Car Co. Rogers Motor Car Co.

Dayton, O.—Dayton Auto Truck Co., Dayton Electric Car Co., Speedwell Motor Car Co., Dayton Motor Car Co., Mead Engine Co., Dayton Electric Laboratories Co., Apple Electric Co., L-C-R Storage Battery Co., Silvey Electric Co., Dayton Body Co., Air-Friction Carburetor Co., Edgemont Machine Co., Blackburn-Allen Co., Joyce-Cridland Co., Dayton Inner Tire Mfg. Co., McCormick Mfg. Co., Victor Tire and Rubber Co., Electro Light and Starter Co., Blackburn-Allen Co., King Top Mfg. Co., Myers Auto Top Co., McVey Mfg. Co., Zwick & Greenwald Wheel Co.

Hamilton, O.—Haven Owens and Rent-schler Co., Republic Motor Car Co.

Youngstown, O.—Republic Rubber Co., Banner Electric Co.

Indianapolis, Ind.—American Motors Co., Cole Motor Car Co., Empire Automobile Co., Henderson Motor Car Co., Ideal Motor Car

Co., Lyons Atlas Co., Mais Motor Truck Co., Marlon Motor Car Co., Motor Car Mfg. Co., National Motor Vehicle Co., Nordyke & Marmon Co., Premier Motor Mfg. Co., Waverley Co., Irvin Mfg. Co., Auto Specialty Mfg. Co., Chapin Mfg. Co., Heitger Carburetor Co., New-Miller Carburetor Co., Wheeler & Schebler, Prest-O-Lite Co., Stutz Auto Parts Co., E. C. Atkins & Co., Duckwall Belting and Hose Co., Robbins & Co., Link-Belt Co., Indianapolis Dash Co., Oakes Co., Rockwood Mfg. Co., Schiedel-Thompson Mfg. Co., Piper Machine Co., Frank S. Feaser Co., Hendricks Novelty Co., Hercules Electric Co., Tiona Refining Co., Zartman Oil Co., Gilson Motor Starting Co., Milholland Machine Co., Glover Equipment Co., Hampton Mfg. Co., Diamond Chain Mfg. Co., Elder Mfg. Co., Gates Mfg. Co., Indiana Auto Top and Rubber Co., Haywood Tire and Equipment Co., Whiteside Wheel Co.

Kokomo, Ind.—Apperson Bros. Automobile Co., Haynes Automobile Co., Bryne, King-

ston & Co., Kokomo Electric Co., Kokomo Tire Co., Long Bros., Planhard Mfg. Co., Wearwell Rubber Co.

Connersville, Ind.—Howard Motor Car Co., McFarland Motor Car Co., Central Car Co., Connersville Wheel Co., Indiana Lamp Co., Wainwright & Sons, Ansted Spring & Axle Co.

Peru, Ind.—Brown Commercial Car Co., Great Western Automobile Co., Model Gas Engine Works, Standard Cabinet Mfg. Co., Peru Electric Mfg. Co.

LaFayette, Ind.—Motsinger Device Mfg. Co., LaFayette Electric & Mfg. Co., Esterline Co., Ross Gear and Tool Co., Ross Machine Co.

Ft. Wayne, Ind.—Ideal Auto Co., Wayne Auto Axle Co., Rostetter & Son, Auto Top Co.

Terre Haute, Ind.—Wabash Gear Works, Standard Wheel Co.

Marion, Ind.—Rutenber Motor Co.

Body Ideas Feature Boston Truck Show

**Eldridge, Edison
and Sowers
Make Their Bow**

BOSTON, Mass., March 24—The annual exhibition of commercial motor vehicles which opened in this city a week ago and closed here tonight has proved to be one of the best yet held by the Boston dealers because of the amount of retail sales made and the general interest engendered in motor trucks by the exhibition. The attendance was not large, but the amount of business done was large in proportion to the numbers attending. The entire New England territory was well represented and many of the sales made were to outside-Boston purchasers.

With a total of fifty-four exhibitors, the show numerically takes second place to the Chicago and New York truck shows, as Chicago had seventy-six exhibitors and New York sixty-six. The Boston lists included practically all the big concerns, with the exception of two or three which were left out because of lack of room to suit them or for other reasons. The list shows forty-eight makers of gasoline machines, six electric machine representatives and one maker of steam cars, this being the first truck show at which the Stanley steam trucks have been displayed.

New Trucks Are Shown

The Boston show had its quota of new trucks not seen either at New York or Chicago, this list including the front-wheel-drive Eldridge electrics made in various load capacities; the new Edison electric



GENERAL VIEW OF BOSTON'S TRUCK SHOW

made in Lawrence, Mass.; the Sowers gasoline truck built in Boston, and the Victor built in Buffalo. The Eldridge vehicles all use the Couple-Gear wheels which incorporate an electric motor in each. These wheels are mounted in front and permit of the use of large-diameter artillery wood wheels with metal tires in rear. The rear wheels vary in size, depending on the load carried, but approach 72 inches in diameter and carry steel tires 4 inches wide and 1 inch thick.

Little can be said of the trucks exhibited so far as chassis details are concerned, as these were fully described in connection with the New York and Chicago shows. Each show, however, has its own peculiar styles of bodies and so important are these becoming that the more interesting types will be reviewed herewith.

One novel body was that of a large Tarvia spreader on a 6½-ton Alco chassis.

Dumping Types for Variety of Purposes Shown

The body is a tank wagon style and has provisions made for heating the Tarvia inside the tank from a steam road roller. Incorporated under the left rear of the tank is a power-driven pump which is used to pump the Tarvia into the tank and also to spray it on to the road through two inverted T-type sprayers.

A type of bodies local to Boston is that of the furniture-moving companies, which are not of the inclosed van type but of the open express style. These bodies approximate 13.5 feet in

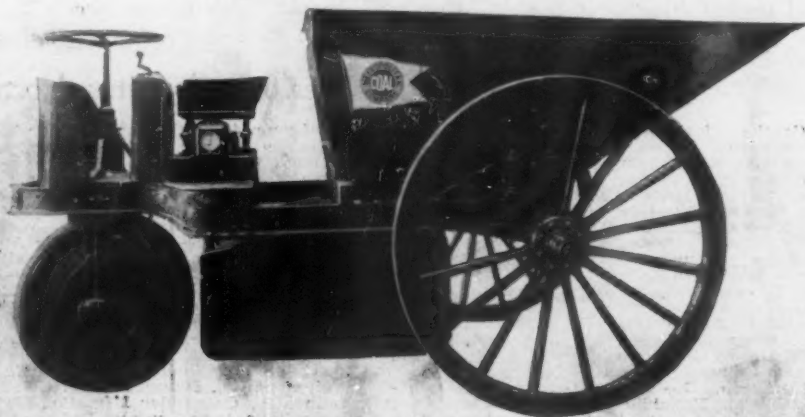
length, are 5 feet wide and the sides are 2 feet high. Across the sides are placed transverse boards 1 inch thick and approximately 6 inches wide. On top of these boards are placed the pieces of furniture to be moved and in the body below them can be carried fragile household goods. Among the concern exhibiting bodies of this type were Packard, Kelley, Knox, Atterbury, Lauth-Juergens and others.

Truck for Ice Cream Trade

The Packard company exhibited an interesting ice-cream body for a Boston house. The body is made with a front compartment, and a rear compartment separated by an aisle extending cross-wise between them. The front compartment measures 4 feet 2 inches long and 4 feet 4 inches wide; the rear compartment is 3 feet 6 inches long and 4 feet 4 inches wide; between the two is the cross aisle 25 inches wide, which can be reached by a



PEERLESS' PORTO RICAN SIGHT-SEEING BUS



ELDREDGE 2-TON THREE-WHEELER

step at either side. The object of this body arrangement is to facilitate loading and unloading of heavy barrels used for conveying the ice cream. The tops of the compartments are not covered.

The Peerless exhibit contained a sight-seeing car with capacity for forty persons. It has been built for use in Porto Rico, where it will operate on schedule over a route 120 miles across the island, making the trip in one direction each day. It resembles open trolley car construction rather than the conventional sight-seeing style. There are five cross-seats, which should accommodate six persons each. At the rear are two short longitudinal seats with baggage space between them. Entrance is by means of two steps at each side, these extending the entire length of the seating portion of the vehicle. These steps fold in when the vehicle is traveling. The total weight is 8,500 pounds, and the speed 12 miles per hour. The body is built on a 3-ton chassis which has a motor with four cylinders each 4.5 by 6.5 inches bore and stroke. There are four of these vehicles at present operating in Porto Rico and two more are being shipped.

Dumping Bodies Exhibited

The various exhibit spaces showed bodies intended for a variety of uses. Naturally dumping types for coal and building construction trade were in great numbers. They were shown by White, Packard, Peerless, Pierce, Locomobile, Velie, and some others. Peerless showed two types, one in which a rack-and-pinion method of dumping is used and the other in which the front end of the body is elevated by means of two vertical chains passing over upper and lower sprockets.

There were many examples of special bodies for such concerns as bakers, fur-

riers, confectionery houses and other concerns using vehicles of 1,500-pounds capacity and over. The White company showed one body for a confectionery house in which a metal interior is used. Provisions are included for a series of adjustable shelves, there being three of these extending from end to end of the body, thereby increasing its useful floor space four-fold. Other concerns exhibited bodies showing a variety of good decorative designs. One of these was an Autocar sold to a Boston furrier. Practically three-quarters of each side is given over to a suitable picture of a polar bear.

Of the new vehicles, the largest exhibit was that of the Eldridge Mfg. Co., Boston, Mass., building front-wheel-drive electrics, and electric tractors with three and four wheels.

One of the vehicles exhibited was a 5-ton Watson stone wagon in which the floor is hinged at each side and opens downward to unload. This wagon is fitted to take removable batteries so two batteries can be used in the same day. The vehicle has a speed of 6 miles per hour. The rear wheels are over 60 inches in diameter and

are shod with 4-inch steel tires.

Another vehicle is the three-wheel cart especially designed for alley use in Boston. It has the driving wheel in front, and a metal dumping body mounted between the two large steel-tired rear wheels. The vehicle has a 2-ton capacity and is especially intended for maneuvering in cramped quarters where it is vehicle. It has a mileage radius of 25 per charge of impossible to use a standard battery and is set to operate at 6 miles to the hour. The Eldridge tractor was shown connected to a trailer for the lumber trade. It is a four-wheel design carrying its own

battery and has a fifth wheel for supporting the forward end of the trailer. The Eldridge company has been marketing these unconventional types of vehicles for upwards of 2 years.

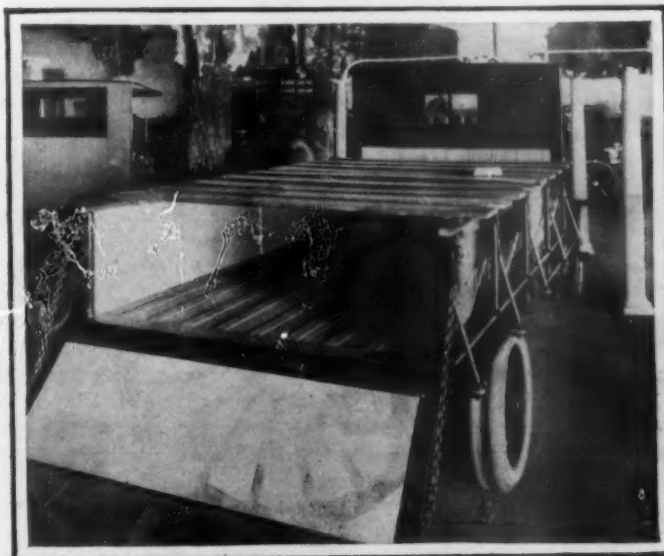
Edison Electric Exhibited

The Edison electric truck is built by the Edison Electric Vehicle Co. of America, Lawrence, Mass., and is in 1,000, 2,000 and 3,000 pound sizes. All of these are built with either side chain or shaft and worm gear drive. They carry Edison batteries and use General Electric or Westinghouse motors. The 1,000-pound vehicle has a speed of 12 miles per hour, and a mileage radius of 55. It uses 34 by 2½ inch solid rubber tires all around. The load-carrying space measures 3 feet 6 inches in width and is 6 feet long. This delivery vehicle is designed for such trades as grocers, butchers, bakers, laundries and department stores.

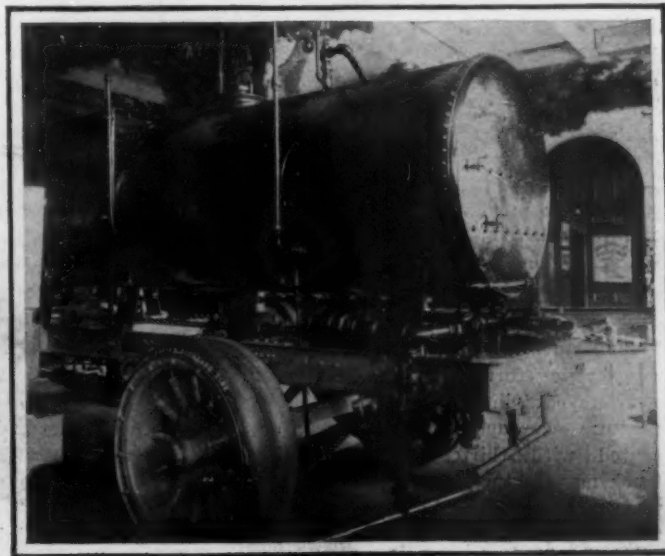
The 2,000-pound wagon has a mileage of 60-mile per battery charge, and a speed of 4 to 12 miles per hour. It has four forward speeds and three reverse. The 3,000-pound vehicle is suitable for express work, and industries needing this capacity. It



EDISON ELECTRIC LIGHT DELIVERY



ATTERBURY FURNITURE BODY



ALCO TARVIA SPREADER

has a speed of 10 to 12 miles per hour, and a battery of 50 miles. The chassis overall measures 154 inches in length and the loading space is 44 by 105 inches. Axles either are Timken or Standard roller bearing types. The David Brown worm and wheel are used when shaft-drive is specified.

The 3,000-pound Sowers truck is manufactured by the Sowers Motor Truck Co., Boston. It is a conventional motor-under-the-seat type with three-speed gearset, combined jackshaft and differential side-chain drive. The vehicle has a loading space 126 inches long and 5 feet wide.

Fact About the Sowers

The wheelbase measures 110 inches and the maximum speed is 16 miles per hour. The front and rear tires are 36 by 3½ and 40 by 4. The motor is a four-cylinder Wisconsin type with 3¼-inch bore and 5-inch stroke. The cylinders are cast in block and have inclosed valve parts. Other motor features are Bosch magneto, Schebler carbureter and thermosiphon cooling. The gearset is a selective one. Steering wheel and control levers are on the right side. The company soon expects to market a 2-ton vehicle with the motor under a forward bonnet, with the steering wheel on the left side, with levers in the center, and a wheelbase of 136 inches.

Marmon at Boston

A truck not seen at New York or Chicago shows, but one which was placed on the market last fall and which was exhibited is the Marmon. This is a 1,500-2,000-pound delivery wagon set to operate at 20 miles per hour. It is largely fashioned after the four-cylinder Marmon passenger car chassis and has the motor under a forward hood, and uses shaft drive. The rear tires are double pneumatics. The wagon is fitted with a self-starter and has right side steering and control.

INDIANAPOLIS SHOW ON

Indianapolis, Ind., March 24—Exhibitors at the local motor car show which opened today say prospects are bright for a good business. Thousands of out-of-town visitors, including many dealers, are expected and a number of agencies will be arranged for and many sales will be made during the week.

The show, which is under the auspices of the Indianapolis Automobile Trade Association, is being held in the Coliseum and its annex at the state fair grounds. There are 65,000 square feet of exhibiting space. There are special attractions for each day, ending with a carnival to be given Saturday night. Thirty-six concerns are showing forty-four makes of gasoline pleasure cars in 121 models; six electric pleasure car manufacturers are represented with thirteen models; thirteen truck manufacturers are represented with twenty-one models; six motorcycle manufacturers are represented with fifteen models. There are thirty-six exhibitors of parts and accessories.

Rates Too Low for Good Service

Railroad Officials Answer Complaints of Detroit Motor Car Manufacturers—Public Carriers Also Hampered by Demands of Their Employes for Higher Pay

DETROIT, Mich., March 22—Freight traffic managers and other railroad officials who are in convention in this city this week, made it clear to Detroit manufacturers and other shippers that in order to accede to the demands for increased railway terminal facilities and quicker and better service in the transportation of package freight and carload lots the only possible means was by the increasing of the existing freight rates.

The present charges are so low, in view of the large increase in cost of transportation, that Detroit cannot expect any better service until they are put on a proportionate basis. Before long a proposal will be made to Detroit manufacturers by those railroads which have been investigating the conditions here.

Paul Wadsworth, general traffic manager of the Delaware and Hudson, in his talk before those gathered at a banquet tendered the visiting officials by the board of commerce, admitted the inadequacy of of the city's shipping facilities, and showed that while the railroads are able to cope with the situation of certain periods of the year, they are unable to meet the vastly greater requirements of other seasons. This is largely due to the plan of the many motor car factories of bringing out new models for spring delivery and being less active during the early fall and winter months. Terminals to handle the enormous business of these busy seasons would mean a large investment, and at the same time they would not be used at the slack times.

Railroads are operating at a very close margin of profit, according to the Delaware and Hudson official. During the last 5 years money has not been very easy to obtain for improvements of equipment and in further touching upon the financial side of the railroads' problem, stated that most loans had to be on short-time paper, that of long terms meaning a high rate of interest and a permanent tax upon the property. Many of the roads have reduced their dividends and thus damaged their credit in the borrowing market. Detroit shippers were urged to cooperate in every way possible with the roads, who are no less interested in efficient and quick service than are the former.

Another speaker showed that the roads are further harassed by their employes on all sides demanding higher pay.

Last summer car manufacturers were compelled to store their finished product in tents and other temporary quarters, owing to the freight car famine. Detroiters contend that the least the railroads can do is to take as good care of this city's

shippers as they do of those of other cities. The lack of foresight at the rapid growth of Detroit in the past few years was given as the chief reason for the present inadequacies of shipping.

The contemplated increases mean only one thing—that the car buyer will have to pay the piper. Motor car makers do not pay freight on the cars which are sold by their agents and therein lies the time-worn reversion to the pocket of the ultimate consumer. Increased freight rates also will mean an increased cost to the buyer of parts in other cities—this will favor Detroit in that it will cause makers in other localities who depend upon Detroit-made parts to think of getting closer to their base of supplies.

HUNTINGTON OFFER DECLINED

Columbus, O., March 24—A proposition, made by F. R. Huntington, a banker of Columbus, to pay 35 cents on the dollar for the claims against the Columbus Buggy Co., now in the hands of the receiver, has been refused and the plan to rehabilitate the concern has fallen through. Only a small number of creditors accepted the proposition. The plan provided that the claims should be filed with the Huntington National Bank and within 48 hours after 70 per cent of the creditors accepted the proposition, the money would be paid.

Another plan to pay the creditors 66½ cents on the dollar is being worked out by the creditors' committee and probably will be announced within a short time. In the meantime the large plant of the concern on Dublin avenue is practically idle.

SETTLING FLANDERS AFFAIRS

Detroit, Mich., March 24—As a final action in the merger of the Flanders Motor Co. of this city with the Maxwell Motor Co., the holders of stock in the former were last week given shares in the parent concern on the basis of about half a share of Maxwell preferred stock, and one each of second preferred and of common stock for each share of Flanders stock.

Following the usual procedure in such negotiations, the books of the Flanders company were completely gone over and audited and the plant and stock inventoried before the formal transfer was made, which accounts for the delay. All Flanders liabilities are assumed by the Maxwell Motor Co. and all its indebtedness squared away.

The plants here, namely, the Flanders, Brush and Alden Sampson plants, are not operating to capacity yet, but men are being taken on as rapidly as possible and

before long some 9,000 men will be employed. The Dayton, O., plant where Stoddard-Daytons were formerly made and the Tarrytown, N. Y., factory, old home of the original Maxwells, also are taking on employes and settling down to serious business.

THOMAS AUCTION COMPLETED

Buffalo, N. Y., March 22—With the sale of the New York-Paris race trophy to C. A. Finnegan of Depew, N. Y., for \$300, the auction of the assets of the late E. R. Thomas Motor Car Co. came to an end Saturday.

The sale, which opened Monday, was one of the most successful ever conducted by the Conants. About 400 bidders were in attendance on each day, but the bidding on the articles was not exceptionally heavy, although the entire sale brought good returns.

J. E. Conant, of Conant & Co., auctioneers, claims that never before in history of the business of that firm has there assembled for auction so many prominent business men, consumers and users. Registered for the sale from the various states were the following number of men: New York state (outside of Buffalo), 36; Michigan, 7; Pennsylvania, 29; Indiana, 6; Missouri, 4; Rhode Island, 3; Illinois, 11; Maryland, 1; Montana, 1; Delaware, 1; Minnesota, 4; England, 6; New Jersey, 4; Kansas, 1; Ohio, 18; Maine, 1; Connecticut, 4; Massachusetts, 9.

Fifteen of the Thomas cars went at

\$1,900 each. Other articles sold were the restaurant, hospital-room and all the office furnishings. One office chair brought only 12 cents. Most of these goods were bought by Mr. Finnegan, of Depew. Although the price officially bid and paid for lot one of the Thomas stock by Mr. Finnegan was \$51,000, the Depew man paid \$5,360 additional for other machinery, working tools, lathes, and other material, which was not included in the first lot but which are exceptionally useful in the manufacture of motor cars. This amount does not include the price paid for the New York-Paris cup and racer, which together brought \$500.

It is thought likely Mr. Finnegan will use the Thomas assets as the nucleus of a car-manufacturing plant. While he would not commit himself, yet he dropped a hint that such was in his mind.

Lot No. 2 of the assets of the Thomas company was disposed of for \$6,000 to Shiffman Iron and Metal Co., of Detroit, Mich.

The entire receipts from the sale of the Thomas assets aggregated \$256,400, divided as follows: Monday, \$84,500; Tuesday, \$17,400; Wednesday, \$72,200; Thursday, \$49,300; Friday, \$11,300; Saturday, \$21,767. About 2,000 persons attended the sale during the 6 days.

Bump Resigns R. C. H. Job

Detroit, Mich., March 21—F. R. Bump, assistant general manager of the R. C. H. Corporation, has severed his connection with the concern, his resignation being accepted by the board of directors in session today.

J. F. Hartz, president of the corporation, will take charge of Mr. Bump's duties for the present. The latter has made no announcement of his future plans.

established monopoly and was a violation of the federal constitution.

The decision of the supreme court in this case is at variance with a decision handed down in the United States district of New York in February, when the judge held that patented articles may not be sold at a fixed price.

MERGER AT GRAND RAPIDS.

Grand Rapids, Mich., March 20—The Michigan Hearse and Automobile Co., capitalized at \$450,000, has been organized at Grand Rapids, Mich., for the manufacture of motor trucks, with motor hearses a special line, and horse-drawn hearses. The new firm, which is among the first to specialize in the building of motor hearses, is a merger of interests of the Michigan Hearse and Carriage Co., which has been in business here for the past 10 years, and the Grand Rapids Motor Truck Co., which removed to Grand Rapids from Decatur, Ind., about a year ago.

The enterprise will be staked entirely by local capital. It will absorb the business and properties of the merged companies, which represents in the case of the hearse and carriage company a valuation of \$75,000, and of the motor truck company \$250,000. In addition stock exceeding \$100,000 has been subscribed by local investors for the extension of the business. The directors of the merged companies are Alvah W. Brown and A. C. Chapman, who conducted the first-named company, and E. A. Clements, Carroll F. Sweet, Frank T. Hulswit, William F. McKnight and L. A. Cornelius of the truck company.

GRAND PALAIS AGING RAPIDLY

Paris, March 19—The Grand Palais, where the salon of motor cars is held annually, is said to be in a very shaky condition. The various floors creak and the weakness of the construction became more pronounced by the flood several years ago. Since then \$160,000 was estimated by a commission to be needed to put the building in shape. The government reduced this sum subsequently to \$100,000, then to \$60,000, and at last to \$20,000.

NEW YORK AGENCY FAILS

New York, March 21—The Stoddard Motor Co., of this city, which formerly handled Stoddard-Dayton products for the old United States Motor Co., was declared a voluntary bankrupt 2 days ago. The liabilities, aggregating \$253,338, are all due to the Maxwell Motor Co., Inc., and the assets are \$66,988. The reason is that the Maxwell company has decided to take the distribution of its products in its own hands.

Chandler Orders New Plant

Cleveland, O., March 24—The Chandler Motor Car Co. is making rapid progress carrying out plans announced several months ago. A deal was closed yesterday with the Belt and Terminal Realty Co. for 6 acres on the Belt Line Railroad, St. Clair and One Hundred and Thirty-first street. A new fireproof steel and concrete building 420 by 120 will be erected at once and will be completed July 1. Shipments begin July 1.

Holds List Prices Must Be Maintained

Washington Court Rules that Cuts on Patented Articles in Chicago's District Makes Merchants Liable for Infringement—Case Carried Up by Big Department Store

CHICAGO, March 25—Word was received here from Washington today of a decision to the effect that a dealer selling patented articles at cut prices anywhere within the jurisdiction of the circuit court of appeals at Chicago is liable for infringement of patent, had been handed down in the United States supreme court. This undoubtedly will have a bearing on the future sales of motor car accessories.

Whether the construction of the law now in force in Chicago is to be the law of the entire country hangs on the decision in another case now pending before the supreme court involving a broader question than that in the case decided. This case, which has been advanced for argument April 7, is a suit for infringement of patent brought by patent medicine manufacturer against a Washington druggist for ignoring the stipulation on the label which states that the nostrum could not be sold for less than a given price. In the lower courts the claims were not allowed and the court of appeals of

the District of Columbia has now asked the supreme court for instructions.

In the case decided yesterday The Fair department store was made a defendant in the old circuit court of Chicago by the Kohler Die and Specialty Co. in a suit for damages because of the sale by The Fair of a gas-heating device which the Kohler company controlled under a patent. The question tried was whether The Fair had violated any law in selling the devices for \$1.25 each, whereas the Kohler company manufactured them for sale at \$1.50 and attached a notice to each device imposing the condition that the device shall not be sold at less than \$1.50.

According to Attorney Walter Chamberlin, who took the appeal to the supreme court for the defendant, the supreme court had affirmed the decision of the circuit court of appeals that patentees could include in their patent notice a fixed sale of price. Attorney Chamberlin argued that the circuit court went without its jurisdiction in making such a decision, which he held was against public policy,

Swedish Honors for American Cars

Overland Fastest in Hill-Climb and Second in Its Class



STOCKHOLM, March 7—American cars made a good showing in the Swedish winter reliability trials, February 23 to 26, the official results of which were announced at a dinner of the Royal Swedish Automobile Club here last night. An Overland was awarded second place in the class II division and a Hupmobile third, in the same division. Another Hupmobile won sixth place in the class I division. The Winter cup, for the winner of class I, went to the Minerva, and the Goteburg cup, for the winner of class II, went to the N. A. G., last year's victor. There were sixty-eight entrants in the tour which was routed from Stockholm to Goteborg and back to Stockholm, a distance of about 700 miles. It was open to all pleasure cars and entrants were divided into two classes on a price basis.

American cars were well represented, and the European factories sent the best products of their plants. The gold plate of the club was awarded to the cars finishing with perfect road scores and ten American cars were so honored. These were: Four

Overlands, two Hupmobiles, Pope-Hartford, two Cadillacs and Hudson.

The summary follows:

STANDING OF PERFECT SCORE CARS IN WINTER CUP CONTEST

No.	Car.	CLASS I		Formula Rating	Time on Kilometer Hill
		Road Running pairs	Re-ning Sch'd-ule		
19	Minerva	0	0	5714	1:31.0
34	Minerva	0	0	3649	1:37.0
8	Horch	0	0	3335	1:23.2
5	Opel	0	0	3224	1:27.4
10	Scania-Vabis	0	0	3135	1:30.4
1	Hupmobile	0	0	2791	1:44.7
29	Pope-Hartford	0	0	2720	1:28.7
7	Fiat	0	0	2443	1:31.8
30	Overland	0	0	2420	1:24.3

ROYALTY AT MOTOR CONTEST

1—King of Sweden; 2—Crown Prince; 3—Crown Princess; 4—Princess Maria, wife of Prince Wilhelm, who is at wheel of Benz.

35	Cadillac	0	0	2375	1:24.6
20	Flat	0	0	2207	1:36.3
16	Mercedes	0	0	2081	1:49.4
14	Horch	0	0	2051	2:10.3
15	Rochet-Schneider	0	0	.....	1:37.8

OTHER CARS WITH PERFECT MECHANICAL SCORES					
12	Scania-Vabis	0	6	.....	1:43.1
26	Overland	0	6	.....	1:30.5
6	Opel	0	7	.....	1:28.8
25	Horch	0	10	.....	1:39.4
2	Cadillac	0	53	.....	1:28.8

GOTEBORG CUP RESULTS CLASS II

No.	Car.	Re- pairs	Sch'd-ule	For- mula	Time on Kilometer Hill
61	N. A. G.	0	0	3589	2:12.4
57	Overland	0	0	2690	1:22.7
63	Hupmobile	0	38	.....	1:47.2
58	Presto	9	6	.....	1:45.6
52	Hupmobile	4	7	.....	1:42.9
51	Overland	14	6	.....	1:32.6
45	Maxwell	14	17	.....	1:43.5
54	Hupmobile	19	68	.....	1:42.1
66	Krit	32	151	.....	2:14.5
59	Krit	33	29	.....	2:15.2

Attention is called to time made by Overland No. 57 on the kilometer hill. This is better than that of any other of the sixty-eight cars that competed. It was also one of the only two cars to have a perfect score in the class.

The schedule penalties are for lateness at controls, etc., and were received by most



AMERICAN OVERLAND, PROMINENT IN TOUR

cars because of errors on the part of drivers and their map readers, in calculation rather than through the fault of the car.

The formula used in determining the winners of the contest was:

$$R=[P(k+1)+O, 06SV^2]V$$

$$O, 01, nD^2 \times L^2$$

P=Weight of car in tons with equipment, passengers and full fuel tanks.

V=The average speed of car during tour, in meters per second.

L=Average rise of hill in millimeters per meter, this year, 37.53 cm. per meter.

D=Bore of cylinders in centimeters.

L=Stroke of motor in centimeters.

n=Number of cylinders.

k=Constant, varying from 12 to 30, according to condition of road during tour. This is decided by the judges just before hill-climbing begins. In this test k=18.

S=0.8 for small racing cars.

=1.0 for large racing cars.

=1.25 for passenger cars with torpedo bodies.

=1.50 for touring car with windshield and top.

=2.00 top for enclosed cars.

This formula was used by this club for first time this year and is claimed to favor small cars.

TEXANS HOLD RELIABILITY

San Antonio, Tex., March 22—The annual run of the San Antonio Automobile Club for the prizes offered by the San Antonio Light and others was completed here Tuesday after a trip to Dallas and return. First prize winners were the Packard 30 in the touring car and the Midland in the roadster classes.

The run was cut down materially en route, as of the eleven starters only five finished. Second place in the touring class was scored by the Chalmers six. This had 212 points against it, while the Packard had 156. Second to the Midland in the roadster division was a Stoddard-Dayton. The winning touring car was entered by the Carter-Mullally Transfer Co. and had John Langford as driver. The Midland car was entered by the Midland Motor Co., George H. King, driver. This car suffered a penalty of 238 points.

The run was a chapter of accidents, which gradually eliminated the entrants in various manners.

The accommodations along the road were good, and the comfort of the contestants outside of running time excellent. While there were one or two protests on awards, the affair was well handled by Referee W. A. Hering.

WILSONS TAFT'S MOTORING HEIRS

Washington, D. C., March 22—The Baker electric used by Mrs. Taft and her daughter, Helen, during the Taft administration, is being used by Miss Eleanor Wilson, youngest daughter of President Woodrow Wilson and Miss Jessie Wilson, the president's eldest daughter, who are taking lessons in the operation of the machine. Practice with the car, which is of the victoria type, and which has the nation's coat of arms on its panels, is going

forward in Executive avenue, between the White House and the state, war and navy building.

Abel Long, who has charge of the White House motor cars, and who drove President and Mrs. Taft many thousands of miles, is the instructor. He says his new pupils are apt and quick to learn. The president's other daughter, Margaret, is expected to take a few lessons when her sisters become proficient.

Under the guidance of Helen Taft, the White House electric was driven through the streets of Washington for 3 years and was a familiar sight on the streets and boulevards.

SEALED-BONNET CAR STILL RUNNING

Philadelphia, Pa., March 22—During the second week of the 30-day sealed bonnet test being conducted by the Automobile Club of Philadelphia, the Multiplex car negotiated 1,201 miles in the 7 days, a daily average of nearly 172. This was considerably lower a mileage compared with the previous week, attributed to March winds and rains almost daily encountered in some sections of the surrounding country axle-deep mud necessitating first speed and in numerous instances the re-tracing of steps and abandonment of certain stretches mapped out and the following of a different route.

ALCO REACHES PITTSBURGH

Pittsburgh, Pa., March 22—Covered with the dust of the roads, the Alco motor truck of John Lucas & Co. arrived here today and ended the first delivery of motor freight in history from Philadelphia to Pittsburgh. The achievement incidentally marked the first overland delivery between these points by any means since a horse-drawn vehicle went over the route 25 years ago after a journey of several weeks. The journey was made without incident, although the roads were none too good.



MINERVA, WINNER OF WINTER CUP. TROPHY SHOWN ABOVE IS THE WINTER CUP

N. A. G., WINNER OF GOTEBOG CUP IN THE SWEDISH RELIABILITY

Kansas Turns Out New Motoring Law

TOPEKA, Kas., March 22—Legislation passed by the last Kansas legislature is of particular interest to motorists, inasmuch as it provides registration fees to be paid to the state, and provides speed limits applicable in any portion of the state. The state license fees take the place of all municipal fees heretofore exacted, and after the act goes into effect, July 1, next, municipalities in the state are prohibited from exacting any fees from owners of motor vehicles.

The registration fees, however, for the most part go into special funds which must be used in the counties where the fees are paid for the maintenance of roads only, and must be used on rural roads. A fee of \$5 a year is exacted from owners of cars, \$4.25 of which goes into the special road fund and the balance goes to the secretary of state to pay for license tags, certificates, and all expenses incident to the administration of the law. The motorcycle license fee is \$2 a year, \$1.50 of which goes into the road fund and the balance to the secretary of state for the same purpose as the percentage of the motor car fees.

The law is drastic in some respects. It provides that a speed of more than 25 miles an hour on any road "shall be presumptive evidence of driving at a rate of speed which is not careful and prudent," and provides penalties for such driving. It provides further that a speed of more than 12 miles an hour in any city or village shall be deemed excessive. Upon approaching railroad crossings, sharp curves, bridges, or persons or animals, the speed must be reduced to not exceed 8 miles an hour until such crossings, etc., are passed, and in approaching street crossings a speed of not to exceed 6 miles an hour is prescribed.

The law is not applicable to non-residents of the state who drive in Kansas for a period of not more than 30 days provided they have complied with the laws of their resident states and display their number plates "substantially as provided in this act."

MICHIGAN LAW HIT

Detroit, Mich., March 24—The supreme court of Michigan has held unconstitutional the clause in the state motor law of 1909, which makes the owner of a motor vehicle liable for any injury occasioned by the negligent operation, by any person, of the owner's car. This does not affect chauffeurs, who are held to be paid servants of the car owner, who is strictly responsible for such employee's actions while the vehicle is under his control.

This is a distinct victory for the motorists of the state and was brought about as a result of a circuit court action brought by one Nina L. Doherty against William S. Thomas, of Grand Rapids. Sev-

Illinois Considering Tire-Dating Bill—Other Legislative Matters

eral years ago Thomas sent his car to a garage for repair and after it had been overhauled an employee of the repair shop took it out without the owner's knowledge, striking the Doherty woman, who sought to secure damages from the owner of the vehicle. The lower court brought in a judgment against the owner, which was last week reversed by the supreme court on the grounds of unconstitutionality of the above named clause.

ILLINOIS HAS TIRE-DATING BILL

Chicago, March 22—A bill fashioned along the lines of the one that is before the New York solons, which will require that all tires made or offered for sale in the state of Illinois be stamped with the date of manufacture and also dated when repaired, etc., has been offered at Springfield by Senator Manny and referred to the committee on parks and boulevards. The bill is a short one and the interesting part of it says:

It shall be unlawful, within this state, for any person, firm or corporation to sell, resell, or otherwise dispose of, any tire to be used on any motor vehicle unless the same shall have been properly stamped, clearly and legibly, and in the English language, with a date, and in such manner, designated thereon, the date when such tire was originally manufactured or made, and when, if such be the condition, such tire was repaired, with the date of such repair, and whether the same is a new or second hand tire, and when or not the same had previously been used, and such tire, when new, shall have a tag pasted thereon, showing the ingredient, composite and component parts thereof.

A fine of not less than \$50 and not more than \$200 shall be imposed for each offense.

TIRE HEARING IN NEW YORK

New York, March 25—A hearing was given on the tire-dating bill at Albany last Thursday before the senate committee on miscellaneous corporations. Several of the large tire companies sent their representatives and the others were represented by Sidney S. Meyers, Jr., who is acting as counsel for all the large tire companies in the country in fighting this objectionable measure.

In the course of the hearing the tire manufacturers vainly endeavored to ascertain who wanted the bill passed, in what way the bill would better existing conditions in the tire industry and, in a word, why this bill, which was supposedly peacefully laid to rest last March, has been resurrected.

The members of the committee seemed to be absolutely ignorant of the bill on which they were supposed to pass. Mr. Meyers brought up the point that the bill is unconstitutional because it is class legislation, stating that: "It provides for the

dating of tires for use on motor-propelled vehicles and this excludes tires for use on buggies, baby carriages and bicycles."

Senator Stilwell distinguished himself by replying as follows: "You say it takes out a class and puts it on motor vehicles only. Are they not the only dangerous class of vehicles? Baby carriages are not as dangerous as motor vehicles, are they? Let's be sensible men."

Among the numerous remarkable statements made by the members of the committee the following passage, taken from the official record, is exceedingly illuminating in regard to the status of the men who represent the people of the Empire state at Albany:

Mr. Meyers: "In order to be fair, you must keep in mind your specific powers."

Mr. Stilwell: "We make the law."

Mr. Meyers: "But you are not above the constitution."

Mr. Stilwell: "Yes, sir; we make the law."

The tire companies are putting up a hard fight against the passage of the bill, although it seems practically impossible to find anyone who is in favor of the passage of such a measure. It is anticipated that they will succeed in their efforts to squelch the measure.

CONGRESSMEN EXEMPT

Washington, D. C., March 24—Under the ruling of the corporation counsel, members of congress and executive officers of the federal government who are legal residents of other states will not be compelled to conform to the new motor regulation imposing upon non-residents the same fee as is assessed by their home state against district motorists.

The question arose in connection with the application of Senator Gallagher, of New Hampshire, for a district license. The corporation counsel, Thomas, informed H. M. Woodward, secretary of the motor board, that, for the purpose of obtaining a license to use his car here, it has been decided that Senator Gallagher is a resident of the district.

In view of this decision, the commissioners today approved the recommendation that members of congress and executive officers of the government, who are required by law to conduct their official business in Washington, be considered residents of the district for the purpose of this regulation. The cost to them for a license will be \$2.

The regulation was aimed principally at the Maryland authorities, who have refused to enter into reciprocal arrangements with the district for the use of the roads by motorists. Under it non-resident applicants for a car license are required to pay the same fee as is claimed by their state against residents of the district.

Great Activity in Good Roads World

CHICAGO, March 24—That the men at the head of governmental affairs in the state of Illinois are in favor of legislation looking toward a permanent system of good roads in the commonwealth was made plain by William McKinley, speaker of the state legislature, at the good roads dinner held Saturday night under the auspices of the good roads committee of the Chicago Association of Commerce at the Hotel Sherman.

Speaking for Governor Dunne, Speaker McKinley said that, while not committing himself as to the relative merits of any of the four or five bills under consideration in the legislature, he was heartily in favor of road improvement in the state; but he was not prepared to say what method to pursue to obtain them. He suggested a campaign of letters to the legislature when the favorite bill came up for its consideration.

Thirty different organizations of business men throughout the state were represented at the dinner. In addition, the 40,000 clubwomen of the state spoke through Mrs. F. W. Blocki of Chicago, Henry Paulman spoke for the motorists and Edwin R. Wright, president of the State Federation of Labor, talked for organized labor in the interests of the use of convicts on road work. The pleas of the rural letter carriers, farmers and truck gardeners and the school teachers in favor of state highway improvement were presented by the representatives of their organizations. A plan as outlined in a good roads bill was presented by Richard Finnegan, secretary of the Illinois Highway Improvement Association and received the indorsement of the meeting.

OHIO ROAD LEGISLATION

Columbus, O., March 22—A flood of good roads legislation was disposed of last week by the house of representatives of the Ohio legislature, making an important step in the cause the good roads advocates have been striving for during a decade. While the measures have not been passed by the senate, very little opposition is expected from that source.

The Hite bill is the most important and was passed by a large vote. It provides for a yearly levy of $\frac{1}{2}$ mill for a period of 10 years for the improvement of the highways. The bill, if enacted into a law, will produce \$36,000,000 in 10 years. Of the amount raised by the levy, 25 per cent is to be used in building the market road system and 75 per cent in building the system of inter-county roads.

Another bill was passed establishing the Portage plan in Ohio. This provides that any association, concern or individual may subscribe 10 per cent and the county 90 per cent towards the improvement of any road.

Chicago Holds Rally—Ohio Passes Legislation—Missourians Busy

A bill was passed compelling township trustees to drag every road at least two times yearly with a split-log drag that is popular in Ohio.

Still another bill was passed, to take the place of the Garrett law, invalidated by the supreme court, providing that in the improvement of roads abutting property owners may pay 10 per cent, the township 15 per cent, the county 25 per cent and the state 50 per cent.

GOOD ROADS ASSURED FOR MISSOURI

St. Louis, Mo., March 21—A good roads programme of state-wide importance was completed yesterday, when the house at Jefferson City passed the last important road measure, which was the Carter resolution submitting to the people at the next election a proposition to levy a mill tax for road purposes.

The resolution has passed the senate and if it should be adopted by the people of the state, tax amounting to more than \$1,500,000 would be collected annually for permanent road-building under the provision of the new state highway department in Missouri.

A similar resolution, by Harris of Boone county, providing that districts may vote separately to levy a tax of not more than 65 cents on the \$100 is pending. It does not fix the minimum and gives the district the right to conduct its own road work independently of the state. This probably will not be urged now that the Carter resolution has passed.

On March 19 the house concurred in the senate bill providing for a system of 7,000 miles of road connecting every county seat in the state. This system is to be laid out within the next 3 months and will be the beginning of a definite plan of highway improvement throughout the state. This bill was introduced in the senate by Senator Hawkins, of Dunklin county.

The laying out of the system will be supervised by the newly created state highway department. The bill, however, creates a county highway board in each county to map the interconnecting system in each county and oversee the dragging. St. Louis, Jackson, Buchanan and Jasper counties are excepted from this provision and the county courts will act as the highway board.

The state will appropriate out of the state motor fund \$15 each year to pay for the dragging of these roads between the county seats the bill provides. This amount will permit them to be dragged eighteen times each year, so that by the

time the next legislature meets the state will have 7,000 miles of good roads.

Other road bills that have passed in this state are:

Creating a state highway department to systematize good road work.

A new benefit road districting law to facilitate the sale of special road district bonds.

Extension of the special district law to counties under township organization.

A series of amendments to the 8-mile special rock road district law to perfect that system of building roads.

ROAD COMMISSION FOR COLORADO

Denver, Colo., March 21—Motorists and good roads promoters throughout Colorado are elated over the enactment of a law creating a highway commission and setting aside a fund of \$750,000 for the construction and improvement of roads. The bill has been passed by the legislature and signed by Governor Ammons, and contains a clause putting it into effect immediately.

The commission will consist of a highway commissioner, a secretary-engineer and an advisory board of five members, and will have authority to expend from \$1 to \$5 for every dollar put up by the several counties for road-building. The amount of money furnished by the state will be determined according to the population and revenue of the respective counties. The roads will be classified in respect to importance, and the main lines of travel will be improved first.

The state has been divided into five highway districts, three in the eastern half and two in the western, and one member of the advisory board will be chosen from each district.

The approval of transferring the \$750,000 from the internal revenue fund to the state road fund is yet to be made by the legislature, and then the governor will appoint the new commission.

IOWA'S INSURANCE LAW

Des Moines, Ia., March 22—A bill providing insurance against losses sustained by owners of motor cars in accidents passed the Iowa house of representatives this week. As originally introduced the bill provided for insurance to indemnify a car owner driving his own car against damages he might incur as results of an accident. However, before passed the bill was amended so that the person or property injured may have the first right to bring suit against the insurance company, and receive his claim, if just, before the insured shares in the benefits of the policy.

Batavia Issuing Stock

New York, March 24—The Batavia Rubber Co., Batavia, N. Y., capitalized at \$500,000, is issuing \$100,000 worth of 6 per cent preferred stock, the total stock of that class amounting to \$250,000. The authorized capital of the company is \$500,000. Its assets are \$234,360, and its liabilities, which include a surplus of \$62,754, the same.

Cyclecar One of Developments of 1913

THE cyclecar craze which has captured Europe is spreading to America and with it comes the promise in the near future of a small car capable of high speeds and carrying two passengers which will sell for under \$400, possibly for half that amount when produced in quantities.

In the letter of the European definition a cyclecar is a car with a motor of less than 67 cubic inches cylinder displacement, and under 672 pounds weight, but in spite of the term a cyclecar is the final word in simplicity for four-wheeled small vehicles for passengers or freight.

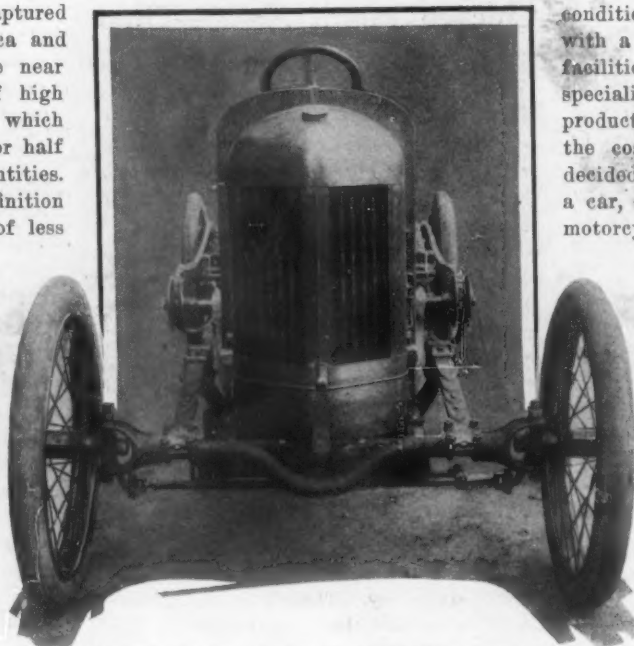
The technical definition as regards motor size and vehicle weight has brought out two classes of car, the small motor car class, and the four-wheeled-motorcycle class. But the original cyclecar was nothing more than a four-wheeled motorcycle, designed by M. Barbeau of Paris, and called the Bedelia. This machine was received immediately as a new type of car and others copied.

Features of First Cyclecar

To get speed with low power this car had a narrow tread, 36 inches in fact, though it was as long as a five-passenger car. The two persons riding sat tandem fashion, and the steering wheel was at the rear. Two speeds were obtained by the adoption of motorcycle belt drive from the countershaft to the rear wheels, and two size pulleys for each gear. Clutch effect was obtained by moving the rear axle to the front or rear, loosening or tightening the belts. The drive from the motorcycle motor to the countershaft was by single roller chain. The body also was the frame of the car, and was low enough so that there were no side doors. Seats were of canvas of the hammock type, like a garden chair.

Taken by the small-car idea, other makers have produced so-called cyclecars embodying four-cylinder motors, clutch, gearset, shaft drive, differential, expanding brakes, etc., among which are the Baby Peugeot in France and the clever Humberette in England. These are excellent cars in their way, but too expensive to be called a cyclecar.

There is no agreement, however, as to what really constitutes a cyclecar; some enthusiasts claim that there should be the simplicity of a motorcycle; others maintain that so long as the cylinder area and the weight limit are not exceeded the vehicle is entitled to be entered in the cyclecar class. Meanwhile



FRONT VIEW OF THE AUTOMOBILLETTE

designs are working themselves out, and it remains to be seen whether the final type of cyclecar will be an amplified motorcycle or a simplified reduction of the big car. Those responsible for the sporting life of the industry are not attempting to cripple inventive genius, for in the cyclecar grand prix to be run by the Automobile Club of France, at Amiens, immediately after the big-car grand prix, the only restrictions are that the cylinder area shall not exceed 67 cubic inches, and the weight be not less than 385 pounds, without oil, gasoline and spares.

The advantages claimed for the cyclecar abroad over the cheaper classes of European and American cars are a lower initial cost, lower upkeep, and ease of storage by reason of the narrow track of the machines. At present prices vary from \$400 to \$950 for a cyclecar. It is impossible to put the cheaper quantity-production American cars on the European market at the lower price, and difficult to sell them at the higher price.

The European cyclecar has at present against it the fact that it is not built in big quantities. It is in an experimental

condition, generally produced by firms with a small amount of capital and poor facilities. When it becomes the highly-specialized production of the big factories, production costs will be cut in half. On the cost of upkeep the cyclecar has a decided advantage; it is taxed lower than a car, in some cases being accepted as a motorcycle; its fuel consumption is lower—an important matter in these days of high gasoline rates, and its tire cost is small.

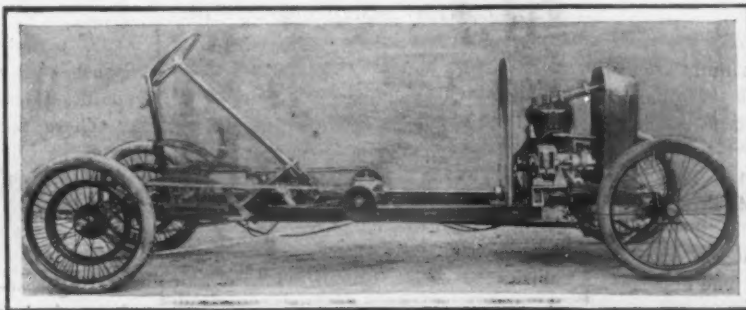
There are some prophets who look upon the European cyclecar as a rival to the cheap American car. This is hardly correct, for the two are not in the same class. The man who is prepared to put down \$700 for a two-seated cyclecar may be tempted to go a little farther and purchase a full-blown cheap American car. In the majority of cases he is not even prepared to come up to the cheap American car class. At present it is largely a sporting vehicle;

but there are indications that it will become a utility car. Already arrangements are being made by certain firms to bring out cyclecars for quick delivery services in cities and suburbs and the possibilities are that a big business may be developed in this direction. There are at least a score of makes on the European market produced on the main Bedelia lines.

Automobillette Appears

The Automobillette may be cited as one of the best developments of the Bedelia class. This has an armored wood frame with slightly curved outer members from dashboard to rear to give the necessary width for the body without having to bend the main frame to receive the power plant. Owing to the objection raised against air-cooled motors for traffic work, a twin-cylinder water-cooled type has been adopted. This is a standard type of motor—cylinders in one casting, L-head, inclosed valves, chain-driven cam and magneto shafts, forced-feed lubrication, and thermo-syphon cooling. Chain transmission to the countershaft has been replaced by a more expensive propeller shaft connected up directly to the motor shaft, without the interposition of a clutch, and with bevel drive to the counter shaft.

These are two bevel pinions on the countershaft having a transverse movement so as to provide forward, reverse and neutral drive. Final drive is by double V-section belt, with the use of variable pulleys. The back axle is pivoted, allowing it to be brought



CHASSIS OF THE AUTOMOBILLETTE CYCLECAR



BEDELIA, FRANCE'S FIRST CYCLECAR, AND BABY PEUGEOT, A FRICTION-DRIVE ONE-CYLINDER TYPE

ahead or pushed to the rear to slacken off or tighten up the belts. This movement of the axle allows the belt to ride in various positions according as the distance is increased or decreased between the two flasks of the pulleys.

On the Automobilette a simplified type of positive steering gear has been adopted. The seats are tandem fashion and unlike some makes, the body is a separate construction. The gasoline tank is mounted on the rear of the dashboard and the bonnet continues straight into the body.

In the Bedelia the steering is by a steel cable winding over a drum on the steering column, a construction which is said to give sweetness of operation and which is certainly simple.

The cars produced abroad have aroused intense interest in America where some score of firms already are experimenting with cyclecars with the idea of early manufacture. It is not too much to expect that within a few years one may buy a 6-horsepower, two-seated cyclecar with a 40-mile speed capability for around \$250 which will practically take the place of the motorcycle since it will give the same first low cost and upkeep, almost as great speed, and will be clean, quiet and dignified.

Trying Out the Idea

A number of the prominent motorcycle firms are experimenting, some having machines actually on the road, and which will be announced for the market shortly. One of these is the Auto-ette Co., of Chrisman, Ill., which has a light car for \$368, which although of small-car size and of standard road tread, is built along cyclecar lines. It has a 96-inch wheelbase, and a 56-inch tread, but uses 26-inch motorcycle wheels and motorcycle tires.

The motor is a De Luxe twin motorcycle motor made by the Spacke Machine Co., of Indianapolis and is rated at 9 horsepower. This is air-cooled and with the two cylinders set at an angle. The engine shaft chain-drive connects to a countershaft with an epicyclic gear in connec-

tion, giving two speeds and reverse. From the countershaft the drive is taken by two 28-degree motorcycle belts, thus doing away with differential and tending toward great simplicity. The weight is given as 400 pounds and the speed at from 2 to 50 miles per hour. The Auto-Ette Co. is planning on 1,000 cars for this year.

This is the first of the American cyclecar announcements, although it is expected that before another season there will be dozens of makes of cyclecars on the market.

For American conditions the cyclecar will have to suit American roads. If not a car of 56-inch tread, which would consume a good deal of power, it must be around 36 inches when a track can be found for it on any road where cars

and horses travel. Seated tandem in the body, the passengers can be as comfortable as in a car, as clean as in a limousine, and can make their 25 miles per hour as easily as a big car.

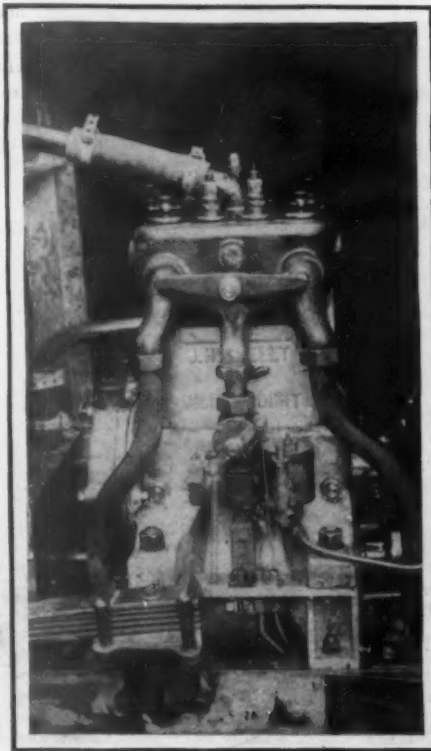
The narrow tread tandem-seated cyclecar is typically French and will in all probability be the eventual American type on account of greater speed and lower cost and upkeep. England is developing more along car lines, but none of these can be bought for under \$500, and so have no future in America. These seat side-by-side and hence have too wide a tread for our roads. English roads are like a floor, and hence tread is a comparatively minor matter. One of these cars on our roads would run continually with the two wheels on one side in a rut. The drag thus caused would eat up power, and hence the cars doing well abroad would be underpowered here.

Some British Types

The British types too have pressed steel frame, gearsets, shaft drive and differential, and in fact are nothing but diminutive cars. This means that their manufacturing cost is high. Five hundred dollars and up can be charged in England, as there is no near motor car competition; but for America these prices are too high and cannot be much lowered except by simplified ideas to accomplish the same ends. This can be done by following motorcycle lines, belt drive, etc.

Among the voiturette or car types produced in England, the Humberette has made by far the best showing in trials, this being a small motor car in every sense except that an air-cooled motor is used. It carries two persons side by side.

There are simpler real cyclecar types, such as the Rollo and Duo, made in England, on real cyclecar lines, which are making excellent records and showing up as well in trials as the car types. The G. N. is an excellent belt-drive cyclecar, also seating side-by-side, or nearly, one person being just far enough behind the other to give elbow room in a 32-inch-width body.



MOTOR USED ON AUTOMOBILETTE

Routes and Touring Information

Answers to Inquiries from Motor Age Readers for Route Information

OMAHA-LOS ANGELES

THIEF RIVER FALLS, MINN.—Editor Motor Age—Please describe the shortest route from Omaha, Neb., to Los Angeles; also some of the conditions to be met with in the worst part of the trip.—E. S.

The Platte valley route over which you will travel in going across Nebraska follows closely the historic Overland route along the North Platte river, which one readily connects with the Mormons' journey. With about 195 miles to Kearney this trail passes through Elkhorn, Waterloo, Fremont, Ames, Schuyler, Benton, Columbus, Duncan, Silver Creek, Clarks' Central City, Chapman, Grand Island, Wood River and Shelton. At Central City a few miles outside of the town is located the Lone Tree monument, which marks the site of a single cottonwood, the landmark of the Mormon trail, from which Central City originally got its name of Lone Tree. At Kearney, a few miles south, can be found excavations marking the site of Fort Kearney where pioneers went for protection from the Indians. Some portions of the pontoon bridge constructed by the army across the Platte river still stand and are of interest.

The second leg of the Platte road to Julesburg, Colo., is 197 miles long, routing through Elm Creek, Lexington, Willow Island, Gothenburg, Maxwell, North Platte, Sutherland, Paxton, Ogalalla and Brule. North Platte lays claim to being the home of W. F. Cody, more familiarly known as Buffalo Bill.

Leaving the gateway of Colorado the going due west to Cheyenne is 145 miles with a gradual upgrade, passing through Chappell, Sidney, Kimball and Burns. Leaving Cheyenne for Medicine Bow, 132 miles, you pass through Tie Siding, Red Buttes and Laramie from which city a 60-mile trip to North Park is advised. To Rock Springs it is 186 miles and the last half will be found the worst roads yet encountered and through more wild and desolate country. Follow through Hanna, Rawlins, Wamsutter, Bitter Creek, Black Buttes, and to Ogden, 202 miles, through Green River, Granger, Liman, Ft. Bridger, Evanston, Castle Rock, Echo, Morgan and South Weber. The Weber canyon scenery will be found most enjoyable.

If you desire to see Salt Lake City, instead of going direct to Ogden as outlined, leave the routing at Emery, going 85 miles to Salt Lake City by way of Coalville and Gorgozo, then getting back on the main road at Ogden through Centerville, Farmington and Clearfield, a distance of 37 miles.

Crossing Wyoming there are two stretches of poor road, one west of Hanna, where it is quite hilly with considerable curves, but nothing that would give trouble in dry weather. A detour from Granger is necessary when the river is high, but it can be forded in dry weather and the road followed through Carter, Bridger and Altamont to Evanston. Table Rock, Utah, to Bitter Creek and Hallville to Point of Rocks are stretches only troublesome in wet weather.

In going around the Salt Lake from Ogden there is an improved and marked road to Brigham City, next passing through Corinne, Bear River, Tremonton, Blue Springs, Snowville, Curlews, Kelton, climbing an impossible looking mountain at the top of which your road turns to the right to Tecoma and Montello. This is 185 miles from Ogden. This

country to the western boundary of Utah was once occupied by the prehistoric Lake Boneville, and the road leads through this old lake bed.

In Nevada your itinerary is Cobre, Curries, Cherry Creek, Ely, Kimberly, Eureka, Austin, Eastgate, Fallon, Leetville, Hazen Station, Wadsworth, Derby, Sparks and Reno. All told a distance of 473 miles. Particular care should be exercised in looking after your gasoline, water and oil supply crossing Nevada and at all times it is advisable to carry an extra supply of each, as towns are infrequent. You should stop the first night at Cobre, then Ely, Austin and Reno. Take along about 100 feet of Manila rope, it will be found most useful for winding around the wheels should you get in a very bad sandy spot; or long strips of canvas will serve the same purpose.

After leaving Reno for Sacramento, Cal., 153 miles, although you travel through the Sierra mountain country, you have good hard roads, passing through Verdi, Truckee, Donner Lake, Emigrant Gap, Alta, Colfax, Weimar, Lake Arthur, Auburn and Folsom. A side trip from Truckee to Lake Tahoe is suggested. This is one of the sight-seeing points of California.

Frisco is reached over fine oiled and gravel roads with 133 miles travel through Elk Grove, Woodbridge, Stockton, French Camp, Livermore, Oakland and the ferry into Frisco.

It is almost unnecessary to give you the itinerary along the Pacific highway to Los Angeles for the reason that it is so well sign-boarded. It naturally receives a great deal of travel and no difficulty will be experienced routing through Colma, Bolcaff, San Mateo, Belmont, Redwood, Mayfield, Santa Clara, San Jose, Los Gatos, Sequel, Aptos, Watsonville, Salinas, Chualar, Soledad, Jolon, Bradley, San Miguel, Paso Robles, Templeton, Santa Margarita, San Luis Obispo, Santa Maria, Garly, Sisquoc, Los Olivos, Los Cruces, Santa Barbara, Carpinteria, Ventura, Calabasas and Hollywood. The distances are as follows: To Santa Cruz, 91 miles; Paso Robles, 149 miles; Santa Barbara, 151 miles; and Los Angeles, 106 miles.

As you did not state when you wished to make this trip, we have outlined one for the summer time, and this should not be attempted before the last of May. For an immediate trip the southern route should be taken. See Blue Book for running directions.

LANARK, ILL.-DENVER, COLO.

Lanark, Ill.—Editor Motor Age—Please outline a route from Lanark to Denver, Colo. The trip is to be made about April 15.—A. J. Hepner.

April is too early to venture to cross the country and prairie roads to Colorado. May 15 would be better. You undoubtedly know how to reach Clinton, Ia., from which city you follow the official transcontinental route as far as Marshalltown, a distance of 166 miles. The itinerary is De Witt, Wheatland, Lowden, Clarence, Mechanicsville, Lisbon, Mt. Vernon, Cedar Rapids, Belle Plaine, Tama, Montour and Le Grand. Des Moines is 71 miles to the southwest and the routing is State Center, Colo. Ames, Hukley and Ankeny. Des Moines to Omaha is 158 miles,

part over the river-to-river and part over the White Pole road through Waukeet, Adell, Dexter, Stuart, Menlo, Casey, Wyota, Atlantic, Marne, Walnut, Avoca, Minden, Neola, Underwood, Weston and Council Bluffs. For your routing as far as Julesburg, Colo., you are referred to the communication captioned Omaha-Los Angeles.

Julesburg to Denver is 210 miles through Sedgwick, Dorsey, Red Lion, Proctor, Sterling, Hillrose, Fort Morgan, Bennett and Watkins. Should you continue to Cheyenne you have two options to Denver, the best on account of fewer grades being through Dover, Nunn, Ault, Eaton, Lucerne, Greeley, Platteville and Gilpin. This is 116 miles. The second road lies through Bulger, Wellington, Fort Collins, Loveland, Berthoud, Longmont and Lafayette.

DES MOINES, IA.-PORTLAND, ORE.

Adel, Ia.—Editor Motor Age—I should like to have a route from Des Moines, Ia., to Portland, Ore., published.—L. V. Russell.

Routing 158 miles to Omaha go first over the river-to-river road through Waukeet and Adel, then the White Pole road through Earlham, Dexter, Stuart, Menlo, Casey, Anita, Wyota, Atlantic and back again on the river road through Marne, Walnut, Avoca, Minden, Neola, Underwood, Weston and Council Bluffs.

For the route to the coast you are referred to the Omaha-Los Angeles routing. San Francisco to Portland would be over the northern section of the Pacific highway and routing back to Sacramento this road takes you through Roseville, Lincoln, Sheridan, Wheatland, Marysville, Oroville, Chico, Red Bluff, Redding, Pitt river ferry, Baird hatchery, Dunsmuir, Sisson, Edgewood, Montague, Coles, Ashland, Medford, Grants Pass, Glendale, Roseburg, Oakland, Drain, Eugene, Salem, Oregon City and Portland.

You will not find the San Francisco-Portland stretch outlined with running direction in any route guide published.

LOUISVILLE-SAN FRANCISCO

Louisville, Ky.—Editor Motor Age—I wish to have a route laid out for me between Louisville, Ky., and San Francisco, Cal., taking in the cities of St. Louis, Mo., Des Moines, Ia., Denver and Salt Lake City. If this is not a good route name the one over which I will find the best roads.—L. Klarer.

The shortest road to French Lick, although good, is practically a toll road the entire 59 miles, and also has a drawback of numerous water bars. The routing is New Albany, Mooresville, Palmyra, Fredericksburg, Paoli and West Baden. The longer road by 15 miles is preferable and runs through New Albany, Smith, St. Joseph, Bennettsville, Borden, Pekin, Salem, Syria, Paoli and West Baden.

Unless you desire to see West Baden and French Lick, both famous for its mineral water, you can save the 11 miles and at Paoli go north 13 miles through Orleans to Mitchell and then 68 miles west to Huron, Shoals and Logootee, Cannelsburg, Montgomery, Washington, Wheatland, Vincennes. Vincennes to St. Louis, 156 miles, will be found good dirt roads, providing you make the trip in dry weather, routing through Lawrenceville, Olney, Flora, Salem, Shat-

tuck, Carlyle, Breeze, Trenton, Shiloh, Belleville and Edgemont.

It is 155 miles to Quincy through Wellston, Pattonville, St. Charles, Harvester, Dardenne, Wentzville, Moscow Mills, Troy, Prairieville, Louisiana, Frankford, New London, Hannibal, Sheperd, Ill., and Quincy. To reach Keokuk, 33 miles, follow through Lima and Hamilton, crossing the river at that point. It is 198 miles to Des Moines, first routing through Illinois to Hamilton and back to Fort Madison, Ia., then on to Houghton, Stockport, Fairfield, Batavia, Ottumwa, Fremont, Cedar, Oskaloosa, Pella, Otley, Monroe, Prairie City and Des Moines.

For the balance of your routing you are referred to the Lanark, Ill., inquiry. Should you want running directions the Blue Books 4 and 5 are recommended.

MINNEAPOLIS-DENVER

Minneapolis, Minn.—Editor Motor Age—I read with a great deal of interest the write-up of the trip through Colorado which recently appeared in Motor Age and am planning now on making that trip in the spring as early as it would be practicable to go, climatic conditions and the probable condition of the roads between here and Denver considered. Would the month of June be a good time as far as Colorado is concerned for making the trip? What would be the best route to take between here and Denver? How soon will the Blue Book be issued that will give the full information in regard to the Colorado roads as furnished by the parties who made the trip last fall?—A. Robertson.

You will find June an ideal month in which to make your trip following the routings given in the Blue Book through Owatonna, Waterloo, Marshalltown, Des Moines, Omaha, Kearney, Julesburg, Sterling and Denver. The 1913 volume 5 will also contain the Colorado directions for which you ask, and will be published about the first of May.

WATERTOWN, S. D.-MINNEAPOLIS

Claremore, Okla.—Editor Motor Age—Next summer I expect to make a trip to Watertown, S. D., then to Minneapolis, but as yet have not decided how I will come back home. Before that time would like to know if the Meridian road would be the best way to make the trip. I would have to go quite a distance west from here to strike this road. Would it be better to go to Kansas City and then on north? I have been to Kansas City by motor car and know the road. By way of the Meridian road I would have to go to Collinsville, Bartlesville, then Caney, Kans., but from there I don't know the route. Will the Meridian road be in good condition by next July?—L. A. Moore.

For your going trip you could take the Meridian road. From Caney you could reach it at Winfield and the farther north you go towards Watertown the better the roads get. There is one drawback to this road, and that is that there is only a pontoon bridge across the Missouri river at Yankton. A ferry can be secured, however.

Motor to Wichita and on to Yankton through Newton, Heston, Moundridge, McPherson, Lindsborg, Salina, Minneapolis, Concordia, Belleville, Chester, Hebron, Strang, Geneva, Fairmont, Stromsburg, Osceola, Shelby, Columbus, Madison, Norfolk, Hadar, Pierce, Wausa, Aten and Yankton. Wichita to Yankton is 430 miles.

Crossing the river proceed through Freeman, Bridgewater, Salem, Madison and Arlington, 170 miles.

Return to Arlington, 39 miles, and head east 21 miles to Brookings, continuing to Owatonna, Minn., through Aurora, Elkton, Lake Benton, Tracy, Walnut Grove, Springfield, New Ulm, Courtland, Mankato, Janesville, Waseca and Meriden, 208 miles. Go north again passing through Milford, Fairbault, Dundas, Northfield, Farmington, Rose-

bault, Dundas, Northfield, Farmington, Rosemount and St. Paul.

A return route over different ground would be through Iowa. This would first take you to Waterloo, 211 miles over a good road, mostly gravel, through Farmington, Northfield, Dundas, Fairbault, Owatonna, Blooming Prairie, Lansing, Austin, Lyle, Mitchell, Osage, Charles City, Plainfield, Waverly and Janesville.

Waterloo to Des Moines, 129 miles over good dirt roads, is via Hudson, Reinbeck, Grundy Center, Marshalltown, State Center, Colo, Ames, Hukley, Ankeny, Des Moines. The Mt. Ayr road to St. Joseph, Mo., is marked with red and white signs, and you will find your way through Boonville, Winterset, Macksburg, Afton, Tingley, Mt. Ayr, Redding, Grant City, Worth, Gentry, Stanberry and Rochester. With 83 miles to Kansas City you will travel through Russellville, Atchison, Lowmont, Leavenworth and Kansas City.

An optional route from Des Moines would take you west through Stewart, Adair, Atlantic, Walnut, Avoca, Minden and Council Bluffs to Omaha, and then to Kansas City on the west side of the Missouri through La Platte, Plattsmouth, Nebraska City, Falls City, Hiawatha, Everts, Huron, Lancaster, Atchison, Lowmont, Leavenworth and Kansas City. The mileage from Des Moines to Kansas City over this route is 380 miles.

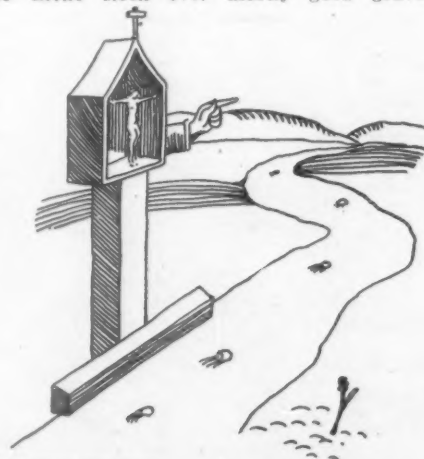
There are many optional routes, as shown by the Blue Book, from which this tour is taken. You will find running directions on all of them with the exception of Claremore to Wichita and Kansas City to Claremore.

DALLAS-LUCERNE, MO.

Teague, Tex.—Editor Motor Age—Please route me from Dallas to Lucerne, Mo., via Springfield, and advise me if there is a better return route than by way of Springfield. What is the character of the roads in spring months; also distances?—E. J. Headen.

Motor Age would not advise you to route through Springfield. Your shortest route through Arkansas and Missouri to Kansas City, although reported as not bad by people living along the way and used to nothing better, is considered about impossible by the more experienced tourists.

Nevertheless, the trip has been made and if you wish to try it all well and good. To Texarkana the routing is 217 miles through Richardson, Plano, McKinney, Melissa, Anna, Sedalia, Pilot Grove, Whitewright, Bonham, Dodd City, Windom, Honey Grove, Petty, Hightown, Brookston, Paris, Blossom, Detroit, Clarksville, Annona, De Kalb, Boston, and Leary. The next 192 miles will take you to Little Rock over mostly good gravel



FROM AN OLD PRINT

A cross-roads pictorial sign-post of the seventeenth century showing the way to Christian Muscovy, which is made note of in John Smith's account of his escape from Tartary. Reproduced from "Touring in 1600," by E. S. Bates

through Homan, Fulton, Hope, Emmet, Prescott, Boughton, Okalona, Dobyville, Arkadelphia, Friendship, Social Hill, Lawrence, Hot Springs, Lonesdale, Fairplay, Benton, and Collegeville. The Little Rock-Fort Smith section of the journey is through Palarm, Conway, Wooster, Plumerville, Morrelton, Atkins, Pottsville, Russellville, cross the Arkansas river to Dardanelle, and continue through Paris and Charleston. Conway to Plumerville by way of Wooster is longer by 10 miles but avoids the Caddo bottoms said to be impassable about two-thirds of the year.

Fort Smith to Neosho is 146 miles and can be made in a day with noon stop at Fayetteville. Cross the river over a fine bridge to Vanburen, routing to Wenslow through the great orchards and cotton country. The Boston mountains, where the only grade of any note on the whole route is found, are next crossed and Fayetteville reached. Headed for Neosho you will have some macadam, some solid flint hills and some plain dirt—no bad grades or bad streams, however. The distance is about 84 miles through Johnson, Springdale, Lowell, Rogers, Bentonville, Centerton, Hiawassa, Plevilla, Neosho. This can be made a night stop or Carthage, which is 20 miles further on a fine road. To reach Springfield you would go from Neosho to Granby, Pierce City, Monett, Aurora and Billings.

The distance to Kansas City from Neosho is 185 miles. Through Kasper, Boston, Lamar, Irwin, and Milo to Nevada the road is part oiled and part macadam and continues 20 miles to Butler. Butler to Adrian, Archie, and Harrisonville is a 40-mile stretch of clay road; to Belton it is 18 miles on a good clay road and on into Kansas City for 25 miles over a rock road.

Routing to Chillicothe you pass through Smithville, Plattsburg, Cameron, Hamilton, Breckenridge, Mooresville and Utica. It will be necessary for you to inquire directions at Chillicothe for Lucerne.

There are no running directions published which cover this route.

OFFERS MONTANA INFORMATION

Bozeman, Mont.—Editor Motor Age—My attention has been called to Motor Age, issue of February 27, to that part of the routing given the correspondent of Vinton, Ia., concerning the Yellowstone park. For that part west of Omaha I would suggest following the Burlington to Billings, Mont., and on to Livingston and Gardiner, the northern entrance to the park. This is by far a more popular entrance to the park and the trip from Livingston to Gardiner over a fine road is well worth the time of anyone coming from the east.

By making the park trip from Gardiner one travels through the beauties of the park at all times, while the trip from Cody involves a most uninteresting ride, both going to and coming from the lake. Even in going to Denver, we here would consider it far better to route from Cheyenne through Pocatello and Idaho Falls up to Yellowstone, the western entrance to the park. From there go north to Butte, on to Garrison and follow the route as outlined.

This club stands ready at all times to furnish all information at our command regarding routes, roads or anything else of interest to motorists concerning this section of Montana.—Gallatin Auto Club.

ARIZONA ROAD INFORMATION

For those motorists who are traveling over the southern route to or from the coast and taking the road through New Mexico from Trinidad to Las Vegas, Santa Fe, Albuquerque and Phoenix, the road by way of Springerville and Globe is good, excepting a slight temporary detour around one spot. Information can be secured from Gustav Becker at Springerville regarding this section of the country.

Accessories Designed for Truck Users

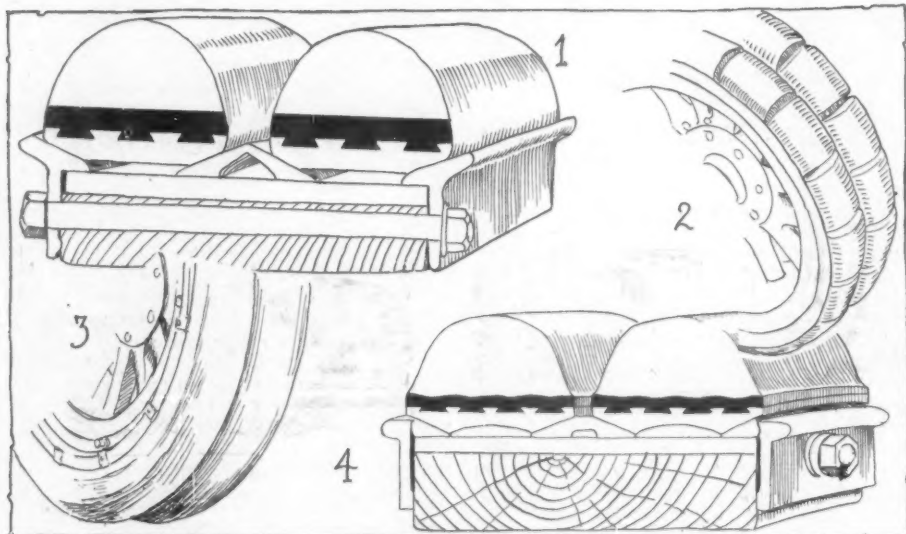


FIG. 1—FOUR TYPES OF DUAL TIRES
1—U. S. Demountable; 2—Victor; 3—Fisk pneumatic; 4—Goodyear

NOT so many years ago such a vehicle as that now known as the motor truck existed only in the stories of such dreamers as H. G. Wells and Jules Verne. When Wells pictured the cities of some far-distant epoch, their teeming millions carried in airships and supplied with foods brought from the central stations without by speeding wagons which were their own means of propulsion, his ideas seemed as little relevant to mundane experiences of the immediate future as did his graphic conflict with the grotesque inhabitants of Mars. The few brief seasons since the coming of the motor car have witnessed remarkable changes in methods of transportation, but none so notable as the growth of the purely commercial motor-driven vehicle away from its elder brother, the motor car for pleasure only.

There has been a more than wonderful advance in motored transportation for business service since the first tentative steps were made. It was not long ago that the little delivery car with its air-cooled two-cylinder motor hung outside of the rear of the body like the little bow on the back of the present-day dandy's hat, attracted a deal of attention as a rival of the dobbie that brought our groceries to the back door. It offers a striking contrast to the mammoth vehicle of today with its power of a hundred horses and capable of 10 tons' burthen.

Early Trucks Passenger Cars

This early commercial vehicle was only one of the first cheap motor cars, popularly known as a buckboard, transformed into a business vehicle by the addition of a covered box back of its single seat. Like this, too, practically all of the early vehicles known as motor trucks were merely passenger vehicles which had undergone a butterfly-to-caterpillar metamorphosis, casting off their attributes of beauty and

assuming their role as useful members of the business world.

Modern motored vehicles for industrial purposes have little in common with their aristocratic brethren, the pleasure cars, except insofar as fundamentals are concerned. The spider web employs the same principles of design as does the mammoth structure bridging Niagara Falls. Our heavy trucks are the suspension bridges of city transport and their evolution from the passenger vehicle has proceeded as far as has the far-flung structure across the cataract from its progenitor, the filmy tracery of the spider.

Truck Accessories an Evolution

Not only has the vehicle itself changed in form from its original type, but the law of evolution has affected the various appurtenances and fitments in the same proportion. The Darwinian theory holds for the truck accessories as well as for the vehicles for which they are intended.

The heavy loads require that the cars be shod with something more substantial than the frail pneumatics. The inertia of the great mass of metal and wood with its 10-ton load requires that special appliances be provided against skidding. The needs of efficiency in service and maintenance require that the managers of the truck departments know how much time is required to make deliveries and how much time is wasted by allowing the vehicle to stand idle; for this there are provided recorders which give a written tell-tale on the driver and his mount, showing the number and duration of stops, the speeds attained, how long the motor was running and a thousand and one other things which the boss wants to know, at the same time telling just when all these things occurred.

When one of these recorders is put on George's truck, he cannot stop at the half-way house for his daily glass of beer and chat with the bartender, without the dumb tattletale on the dash tipping off his boss to the fact. He cannot take a joy-ride in the truck and break all speed limits and run away with the speed guarantee of the tire company without the boss reading all about it on the little paper dial of the recorder.

Automatic Tattletales

If George is not guided in the matter of speed by the thoughts of what the boss will say, there is a more direct appeal to his better judgment offered in some of the speedometers designed especially for truck use. These have warning signals which flash up in front of his eyes and shout in capital letters, SLOW DOWN!

Attempts to make wheels which will rival air in easy riding qualities and at the same time have the lasting qualities of steel are many. So far, none of them have attained a great lead over the others but many of them show possibilities.

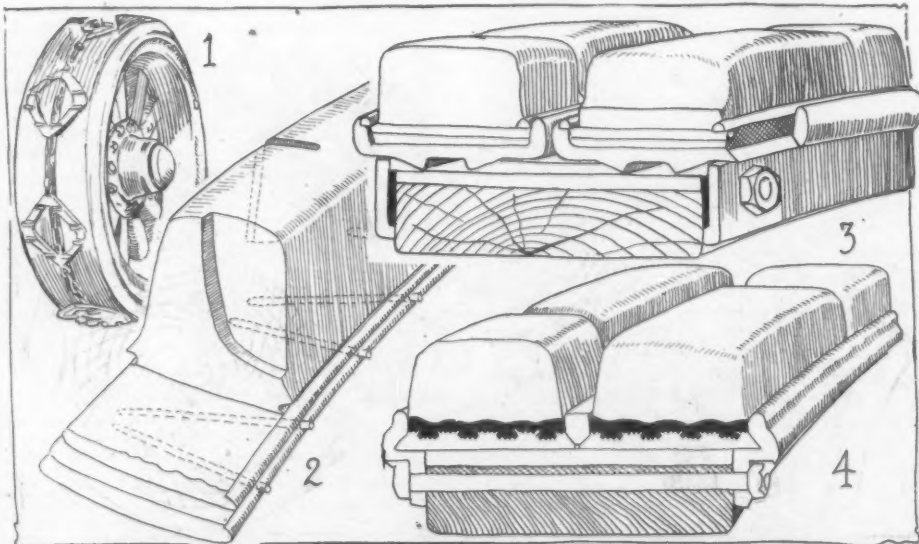


FIG. 2—THREE SOLID TIRE TYPES AND NON-SKID CHAIN
1—Eureka Non-skid chains; 2—St. Louis Notch; 3—Firestone; 4—Goodrich block

Fitments for Commercial Purposes

Some of the special accessories for commercial vehicles are illustrated and described on these pages.

Pioneer Steel Block Tire

Two views of the Pioneer steel block tire are shown in Fig. 6. To fully understand the construction the cross-sectional diagrams at the right of Fig. 6 will be described. The heavy black area represents an endless cushion of rubber resting on the rim of the tire. Above this rubber is what is called a follower plate. There are fourteen of these plates around the rim of the tire. Above each plate are two spiral springs, and upon the spiral springs rest the steel blocks, which are hollow. The road shock is transmitted first to the steel block, then to the spiral springs and through the follower plate to the rubber cushion. The blocks are held in position by a flange. There are grooves on the inside of this flange into which tongues on the steel blocks fit. The flange is shown on the side of wheel illustrated on the left of Fig. 6. The other parts are held rigidly in place to prevent any surface friction. The maker, the Pioneer Steel Block Tire Co., St. Louis, claims that the steel used in the blocks will outlast the truck and that the springs and rubber cushions are so made as to give the maximum amount of resiliency possible in a truck tire.

Federal Chains

Why cannot the truck be prevented from skidding in the same way as the touring car? With this question in mind, the Federal Chain & Mfg. Co., Springfield, Mass., brought out some time ago an anti-skid chain for motor trucks. The chain attached to a wheel is shown in the left of Fig. 7. The feature of Federal chains is that they do not take up much room when not in use and require but a few minutes' time for application. Not so long ago chain manufacturers could not perfect a

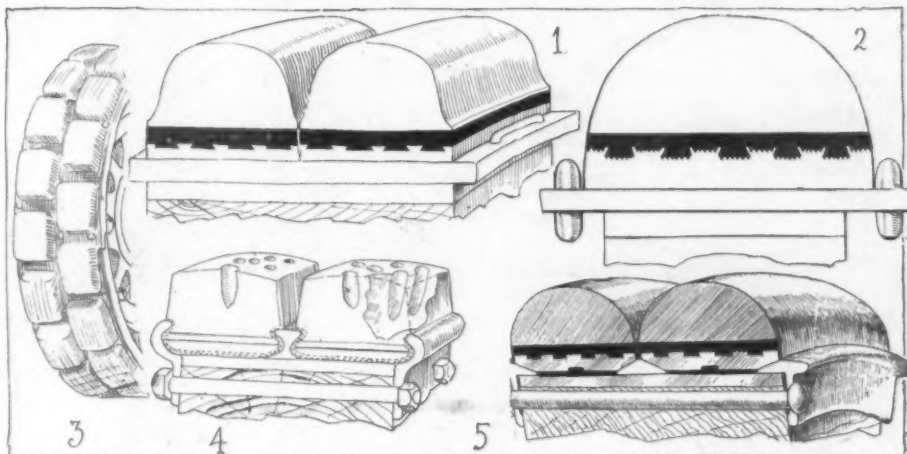


FIG. 3—TRUCK TIRES IN FIVE FORMS
1—Republic, European type; 2—Polack; 3—Kelly-Springfield; 4—Swinchart cellular; 5—Pennsylvania

chain that would fit snugly to the tire of the truck and still have non-skid qualities. The Federal company believes that it has overcome this difficulty. The chain consists of four bands, which fit almost completely around the tire and rim. These bands are connected by chains on either side. The chains are placed on the road under the wheel and the clamping units brought together. A feature of these chains is that the surface in contact with the tire is shaped as the tire is shaped, so that injury to the tire is reduced as much as possible. Federal quick-detachable grips are made of nickel steel, according to a statement made by the manufacturer.

Eureka Anti-skid Chain

An effective non-skid device is shown in Fig. 2, which is marketed by the Eureka Non-skid Mfg. Co., Brooklyn, N. Y., under the name of Eureka. It consists of a number of quadrilaterally shaped metal pieces connected by short chains. The rough surfaces presented to

the pavement have a cutting effect that resists side skidding. Traction is increased without greatly injuring the tire tread.

Never Skid Chains

Another skid preventing device for trucks is being marketed by the Never-Skid Mfg. Co., New York, under the name of Never-Skid chains. These are designed especially for dual tires, and when in position appear as shown at the right of Fig. 7. The chain consists of a series of frogs linked together. The maker claims that the great affinity of the chain for the tire causes the former to hug the tire continually. This firm gripping is one of the features of the Never-Skid chain. Each frog is cast in the form of a cross. The central portion fits into the groove between the dual tires. This almost entirely prevents the chain slipping off. A master link is used to bring the chain taut. Hardened steel pins with cotter-pinned ends are used to hold the links together. A number of holes are provided in the master link or frog to give a range of adjustment and a special tool is sold with the chain for making the chain fit as tightly as is desired. The maker claims that a motor truck will get traction with the use of Never-Skid chains even on very slippery roads.

Sewell Wheel

Besides the Sewell cushion wheel manufactured by the Sewell Cushion Wheel Co., Detroit, Mich., shown in Fig. 9, two other types are being manufactured. The one in the illustration shows an accordion-shaped rubber cushion lying between the felloe of the wheel and the floating rim. A flange on the side of the wheel keeps both floating rim and rubber cushion in place. For exceedingly heavy trucks, the accordion cushion is discarded and the solid type substituted. For light cars the cushioning is gotten by a series of rubber tubes lying across the wheel. In all three

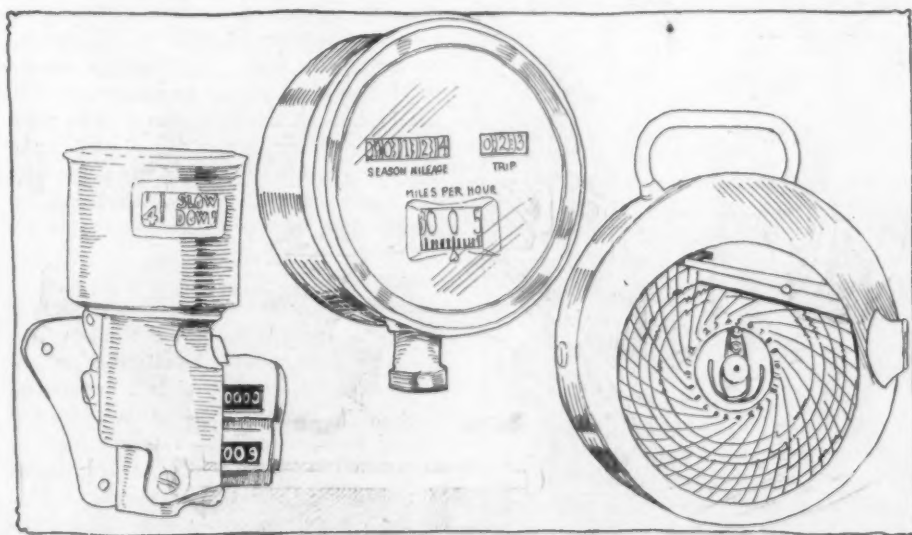


FIG. 4—SPECIAL SPEED-INDICATING AND RECORDING INSTRUMENTS
1—Warner; 2—Stewart; 3—Traflog recording speedometer

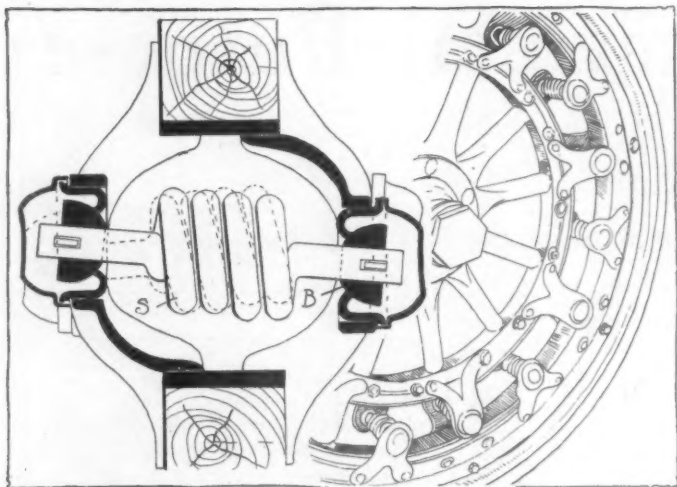


FIG. 5—TWO VIEWS OF SEATON SPRING WHEEL.
Resiliency is obtained by horizontal coiled springs

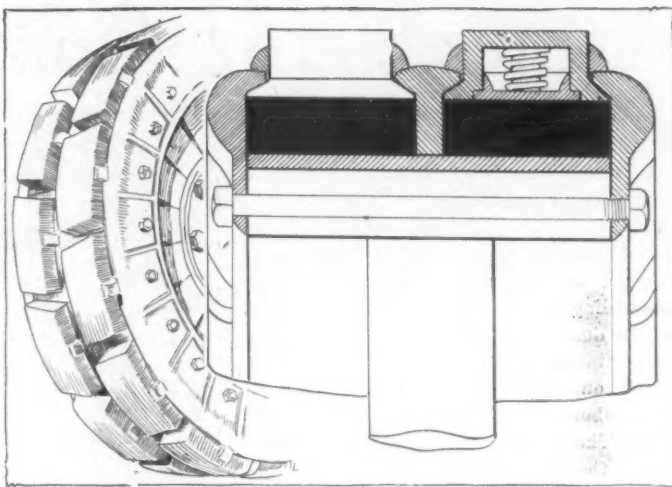


FIG. 6—PIONEER STEEL BLOCK TIRE
Cross-sectional diagram at the right

types the principle is the same. The shock first is transmitted to the tire of the truck and finally to rubber cushion.

Trafilog Recording Speedometer

The Brown Trafilog Co., Cleveland, O., the manufacturer of the Trafilog, has applied the expression "recording time clock" to this device. It is an instrument which registers everything the truck does, when it stopped, how long it stopped, when it started, whether the motor was running when the car stopped, in fact, nearly everything about the truck and driver except what the latter ate at luncheon. The device is dependent upon vibration for successful operation, and the maker claims that during his experiments it has proven itself fully efficient. The complete apparatus is shown in Fig. 4. Two types are made—one an 8-day recorder and the other a 1-day. In operation, marks are made upon the chart of the instrument, showing the time the car was moving and when the car stopped and whether the motor was shut down when it stopped. An odometer attachment may be used in connection with the Trafilog, thus getting a complete record of the doings of the motor truck.

Stewart Truck Speedometer

Model E is the name given to the special truck type of speedometer marketed by the Stewart-Warner Speedometer Corp., Chicago. The maximum speed registering ability of this magnetic type of instrument is 30 miles. The total mileage window will show as high as 100,000 miles. A 100-mile trip window is provided. Like all Stewart instruments, the machine may be reset to any tenth of a mile, without disturbing the record of the season register. The face of the instrument is 3 inches in diameter and is silver-etched.

Warner Warning Speedometer

With a Warner truck speedometer on the dash the driver is confronted with the words "Slow Down" as soon as the he attempts to go faster than 15 miles per hour. It acts like a man on guard, telling the driver to be careful. Sadly enough, the instrument cannot speak, but

the maker claims that the verbal sign is sufficient to cause the driver to take heed. A 100-mile trip and a 10,000 mile season recorder is used. At the extreme left of Fig. 4 the Warner speedometer is shown with the words "Slow Down" before the window. It is made by the Stewart-Warner Corp., Chicago.

Dow Dual Wheels

The Dual Wheel Co., New York city, is manufacturing Dow dual wheels which are unlike the usual type. The wheels are on different longitudinal centers and at different distances from the jackshaft, as shown in Fig. 8. Both wheels are designed to drive. The drive is from the jackshaft to both wheels by separate chains and sprockets, both running at the same speed. The brakes operate on the two rearmost wheels only. The maker claims that the increased traction surface not only decreases tire wear but lessens the shocks to a considerable degree. In backing against the curb, the last set of wheels may go over the curb, while the other two wheels remain on the road. This arrangement permits the truck to back against a building almost and at the same time get traction when starting again. In backing over the curb, the rear

set of wheels move upward without materially changing the position of the body with reference to the ground. Each of the four rear wheels carries the same weight. Skidding is said to be almost entirely eliminated when Dow wheels are used, because the tires make contact with the road at four points. It is easier to get traction with four wheels than with two wheels only.

Firestone Tire

Several types of solid tires are manufactured by the Firestone Tire & Rubber Co., Akron, O., including special tires for electric vehicles. In Fig. 2 one type of commercial car tire is shown. The notched tread, as it is called, is fitted upon a dual wheel. It is of the side wire type with an endless soft rubber base. The tires are removable by removing first bolts and flanges. One of the bolts is shown in the illustration. The nuts are taken off first and the flange next. The tire then is slipped over its base.

Goodrich Tire

A wireless tire with a hard rubber base manufactured by the B. F. Goodrich Co., Akron, O., is shown in Fig. 2. An endless ring separates the two sections of the tire. The tire is held in place by flanges which are bolted to the wheel. Removing the bolts, removes the flanges and hence the tire may be removed easily. The blocks are placed end to end, forming a complete tire. One of the blocks of the tire, known as a key block, has a key seat which engages with the key on the felloe band. The tires are interchangeable on the rims.

Fisk Tires

With a view to making fire apparatus safe and speedy the Fisk Rubber Co., Chicopee Falls, Mass., is offering a dual pneumatic tire. It is designed to successfully carry heavy loads without using a tire of large cross-sectional area and at the same time give the required amount of resiliency. The tire is shown in Fig. 1. Both tires are easily removable from the rim by unscrewing twelve nuts and slipping off the holding ring. The valve

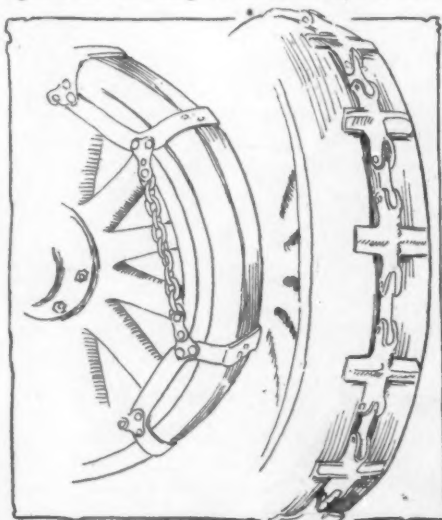


FIG. 7—TWO TYPES OF TRUCK CHAINS
Federal at left and Never-Skid at right

of the inner tube does not protrude through the felloe, thus exposing it to injury. The valve is of the angle type and comes through the wheel at the side.

St. Louis Notch Tire

In Fig. 2 one type of St. Louis notch tire, made by the St. Louis Tire & Rubber Co., St. Louis, Mo., is shown. This tire has been in use on a number of fire wagons with marked success. It is claimed by the maker that the notches, which are at an angle of 20 degrees, prevent skidding. Tire creeping is hindered by the use of cross wires, represented in Fig. 2 by dotted lines. The tire is built for any clincher rim.

Victor Tire

A dual tire resembling somewhat a pneumatic tire, as shown in Fig. 1, is being marketed by the Victor Rubber Co., Springfield, O. A series of rubber blocks with rounded tops give the effect of a pneumatic tire, it is said, and at the same time the blocks to some extent prevent skidding. Each block is fastened separately. The individual block design permits of one or more blocks being removed without removing the whole tire. The blocks are of rubber with steel rods running through them at the base. The rods project beyond the rubber and are inserted in a locking bar.

Kelly-Springfield Tires

Three types of solid tires are offered by the Kelly-Springfield Tire Co., Akron, O. These are the block tires shown in Fig. 3, the endless solid-line and the side-wire tire. The block tire is in sections, these having wide flanges at the base. These flanges fit into a recess on the felloe. The blocks may be removed individually by removing the bolts that hold the section in place. Through the base of each block run longitudinally three wires. The base itself is protected by a layer of fabric.

Fromann Cushion Wheel

The claim is made by the Wheel of Fortune Co., Chicago, that the cushion wheel known as the Fromann wheel will receive road shock and distribute it over two-fifths of the wheel's circumference, making it as nearly as possible give the effect of a pneumatic-tired wheel. In Fig. 10 is shown the construction of the Fromann wheel. It rests upon wooden blocks W. These blocks are in separate retainers. The retainers are upon a metal base. Underneath the metal base are sections of soft solid rubber R. In other words, the

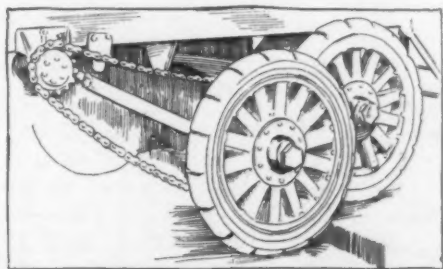


FIG. 8—VIEW OF DUAL WHEELS
Showing how the rear set may go over the curb

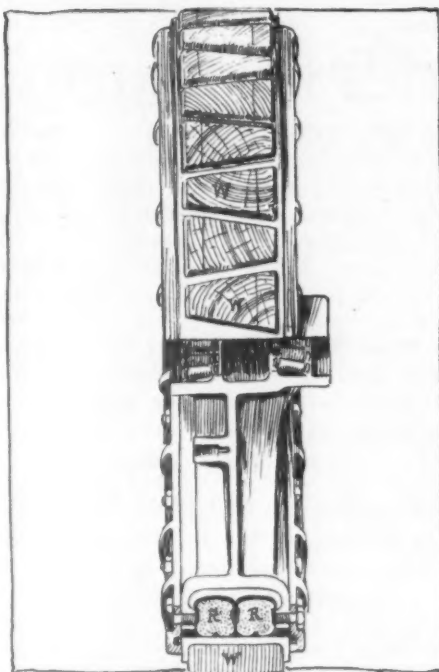


FIG. 10—CONSTRUCTION OF FROMANN WHEEL

A combination of wooden blocks and rubber cushions is employed

rim floats. A flange on the rim of the wheel is made to protect the inner rubber cushions from water and dirt. The wheel itself is a composition metal casting and

Back Door Deliveries by Truck

MANY delays are met with by drivers of motor trucks in delivering packages to apartments or flat buildings. Much of the delivery can be done from the alley, if the entire street consists of apartments where all deliveries must be made at the rear; but drivers prefer to deliver from the street side of the buildings. On streets where there are but a few flats, drivers unused to the route try at first to deliver goods to the front doors, but after a while come to know those places where goods will not be received at the front but must be taken to the back.

A helper on a motor truck for a Chicago dry goods store was left at the door of an apartment hotel with a box containing some 30 pounds of merchandise. The truck drove on to pick up the helper at a corner further down the route. When the helper appeared at the front door he was very unceremoniously ordered to the rear, the owner refusing to accept the package. The helper left in high dudgeon, only increased when he found outside that he would need to walk to the end of the block to the alley, and then back to the rear of the apartment, a block and a half distance in all, after which he would have the walk back. Five minutes after he had left, the motor truck returned searching for him, turned around and waited, 4 minutes later he came back swearing. The total time of the delivery stop was 11 minutes.

is said to weigh not more than a wooden wheel of the same size. Should any portion of the rubber become worn a section may be removed by taking off a number of nuts and a new section put in its place.

Polack Truck Tires

These truck tires, marketed by the Polack Tyre & Rubber Co., New York, are of the hard-rubber base with metal sub-base type. The hard rubber base is vulcanized into the soft rubber tread and the base is dovetailed into the metal sub-base.

Pennsylvania Truck Tires

As will be seen in Fig. 3, the Pennsylvania dual truck tire is demountable by removing the bolts which run through the felloe of the wheel. It is similar to other makes on the market in that it has a soft rubber tread, hard rubber base and is mounted on a metal sub-base. A floating ring separates the two parts of the tire.

Swinehart

The feature of the Swinehart line this year is the cellular tire which is made both in the dual and single types. It will be seen from the illustration in Fig. 3 that the blocks contain a number of holes. These are designed to prevent skidding. Besides the cellular type the Swinehart Tire and Rubber Co., Akron, O., is manufacturing block tires, clinches and smooth tread types.

United States Tires

The United States Tire Co., New York, manufactures three types of commercial car tires, the pressed-on fabric base, the dual-demountable, hard rubber base, and the block tire. The dual demountable is illustrated in Fig. 1. The tire is held in place by bolts which run through flanges on the sides of the wheel. Between the two parts of the dual tire is a ring, which is removable, although this is not necessary to remove the tire.

Republic Truck Tires

Recently the pressed-on European type of dual tire has been added to the line of the Republic Rubber Co., Youngstown, O. The tire itself is of soft rubber and is mounted on a hard rubber base. The base rests upon a sub-base of metal. This tire is of the true dual type, having two treads on a single base.

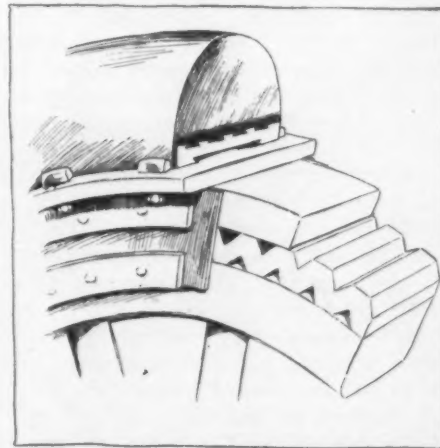


FIG. 9—SEWELL CUSHION WHEEL
This type designed for trucks of medium capacity



The Readers' Clearing House

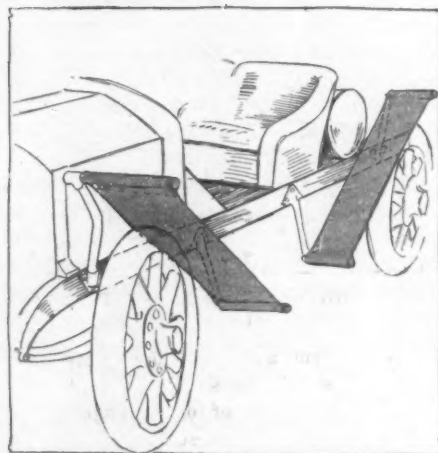


FIG. 1—CANVAS MUD GUARDS AS USED ON RACING CARS

CANVAS MUD GUARDS FOR RACERS

Hoosier Wants Design of Fender for Speedy Type of Car

EVANSVILLE, IND.—Editor Motor Age—I would like information and designs for canvas or leather fenders or mud guards, such as are sometimes seen on racing cars.

2—Is it better to use canvas or leather?—Barney.

1—These fenders are very simple to apply, consisting of strips of canvas stretched over iron braces, which are secured in the most convenient manner. Fig. 1 shows a few suggestions these can be no more than tentative because of the modifications that will be necessary on different makes of cars.

2—Canvas is preferable, as it will not curl when it is wet, it will not stiffen when it dries, it is lighter, and cheaper.

TEMPERING OF MOTOR CAR GEARS

Methods of Hardening Vary—Compositions of Metals Have Wide Limits

Denver, Colo.—Editor Motor Age—Kindly explain in detail the process now in use for tempering gears for transmission, differentials and camshafts. Also the kind of steel used.—C. F. W.

Since every manufacturer has his particular way of treating gears, it would not be proper to give an example and make it hold true for all makes of gears. In most instances the gears used in motor cars for gearsets are of chrome or chrome-nickle steel. The chromium runs from .3 to about 2 per cent and the nickle a little more than that figure. However, case-hardening is the first step usually in the treatment. It is referred to as cementation with carbon.

This process consists in heating the cut gear to a red heat and then permitting it to rest in a bed of carbon for a while. As soon as the gear becomes cold it is again heated and the action continued. It is repeated until the absorption of carbon is very great. Often a 3-16 inch

case is permitted to form. After the gear has been case-hardened it is heat-treated, which consists of it being heated several times at varying or perhaps the same temperature according to the composition of the steel.

Camshaft gears vary from ordinary cast steel to nickle and chrome-nickle steel. The case-hardening methods for camshaft gears are the same as those for the other gears.

FOUR MORE ECONOMICAL THAN SIX Of Two Motors of Same Piston Displacement, Four Uses Less Fuel

VINCENNES, IND.—Editor Motor Age—I have in mind two motors, one $4\frac{1}{4}$ by $5\frac{1}{4}$, four-cylinder, the other $4\frac{1}{4}$ by 5 inches, six-cylinder, these being only 35 cubic inches different in displacement and both Wisconsin motors; both motors being used in the same make of car of practically the same weight. Which motor would be most economical to operate and why?

2—What is the weight of the Stutz four-cylinder car, and the miles per gallon?

3—What is the complete weight of the Cole 50, also how many miles per gallon will the model 50 do?

4—Give complete weight of Westcott, model 50.

5—Can Motor Age give the depth of upholstery on the 1913 Stutz car?—W. R. T.

1—Assuming that both motors are equally well designed, which is likely, being of the same make, the four would be the more economical to operate, provided it was adequate to move the chassis in which it was applied. The four has a displacement of 389.9 cubic inches, while the six has 425.4 cubic inches of piston displacement. The S. A. E. horsepower of the four is 36.1, while by the same rating, the six develops 43.8. Assuming both motors equally efficient, the six motor to develop greater horsepower will have to burn more gasoline per minute. On the other hand, if the four-cylinder chassis is too heavy for a 36-horsepower motor, so much low-gear will be done that the better-adapted six will prove the more economical.

By the modified S. A. E. formula, which takes the stroke into consideration, the four-cylinder type shows 49.6 horsepower, while the six produces 54.1 at 1500 revolutions per minute. The difference between the horsepower of the two motors by the S. A. E. rating amounts to 7.7 horsepower, or roughly $\frac{1}{4}$ of the horsepower of the six. The difference by the modified rating is 4.5 horsepower, or but roughly 1-14 of the power of the six. This difference is so small that it is evident by the more accurate rating, that the necessarily smaller, lighter and simpler four-cylinder motor is the more efficient.

2—3150 pounds, 12-14 miles per gallon.

3—3650 pounds, 12-15 miles per gallon.

4—3500 pounds.

5—10 inches.

HORSEPOWER RATING FORMULAS

Many Methods Have Been Proposed For Finding Engine Power

Chicago, Ill.—Editor Motor Age—Will you please publish in your columns the rules for figuring the horsepower of a gasoline motor, both by the A. L. A. M. and the foreign methods of rating?—H. E. Wickwire.

The A. L. A. M. formula is now called the S. A. E. formula due to the fact that the former organization no longer exists. The present S. A. E. formula and the English R. A. C. formula are the same.

D^2N

H. P. = $\frac{D^2N}{2.5}$, in which

D is the bore of the motor in inches and N the number of cylinders.

The denominator, 2.5 is a constant.

Roberts formula is:

D^2SRN

H. P. = $\frac{D^2SRN}{13,500}$

Where D = bore in inches

S = stroke in inches

R = revolutions per minute

N = number of cylinders

The modified S. A. E. formula is the same except that the constant divisor is 15,000.

GRAY BEST COLOR FOR MOTOR CAR

Neutral Tints Show Dust the Least—Length of Wheelbase

ARLINGTON, S. DAK.—Editor Motor Age—Which is better, gray or black, for country roads as to showing dirt and dust, also more liable to have paint fade.

2—Is a car of 116-inch wheelbase long enough to seat six passengers comfortably.—A Subscriber.

1—Gray.

2—It depends on the design of the body and the length of hood. Leg room rather than wheelbase determines this.

Questions Answered and Communications

Barney.....Evansville, Ind.
C. F. W.....Denver, Colo.
W. R. T.....Vincennes, Ind.
M. E. Wickwire.....Chicago
A Subscriber.....Arlington, S. Dak.
Subscriber.....Clarence, Mo.
H. R. Bygel.....Dayton, Ia.
J. W. Hatcher.....Pecos, Tex.
F. Kolar.....Bisbee, Minn.
E. W. Stern.....Hendricks, Minn.
Edgar Stanton.....Winnetka, Ill.
A. D. Carpenter.....Sauk Center, Minn.
Thomas J. Olsen.....Reno, Nev.
L. S. A.....Hoosac, N. Y.
Granville Leach.....Linton, Ind.
D.....Cordova, Tex.
W. R. Baumgardner.....Colchester, Ill.
Coal Oil.....Neodesha, Kan.
C. C. Hahn.....Wellman, Ia.
Hiram P. Steiner.....Bluffton, O.
McIntosh-Vick Auto Co.....Saskatoon, Sask.
A Reader.....Madison, Wis.
Charles J. Ohlsson.....Brooklyn, N. Y.
O. J. Cole.....Cox's Creek, Ky.
A. M. Haynes.....Riverside, Cal.
Rollin E. Smith.....Minneapolis, Minn.
H. L. Magill.....Chicago
A Reader.....Nellisville, Wis.
Conrad Johnson.....Akron, Ia.
Reader.....Lake City, Minn.
Charles Golding.....Frederika, Ia.
Subscriber.....Mexico, Mo.
J. B. Halpin.....St. Louis, Mo.
H. Cassidy.....Brookhaven, Miss.

WEIGHTS AND OTHER CAR DETAILS**Carbureters, Lighting Systems and Lubrication of Cars Given**

Clarence, Mo.—Editor Motor Age—What are the weights of the 1913 Chalmers 30, Chalmers 36, Studebaker 30, and Reo the Fifth, all fully equipped and tanks filled?

2—What kind of carbureter and magneto are used on the Chalmers 30 and 36?

3—What was the output of Reo the Fifth cars for the season of 1912?

4—How long will the storage battery in the lighting system of the 1913 Reo the Fifth operate the electric lights without recharging?

5—Describe the oiling system of the Reo the Fifth cars.

6—How many of the parts of the Reo cars are made by the Reo Motor Car Co.?—Subscriber.

1—In the order asked, these weights are, 2,650, 3,250, 2,100, and 2,600 pounds respectively.

2—Rayfield.

3—This is not ascertainable.

4—40 hours.

5—This oiling system is of the ordinary circulating splash system, in which the cylinders and crank pins are lubricated by the splash of the connecting-rods in the oil contained in the crankcase, while this oil is supplied by means of a pump which forces the oil, stored in a reservoir beneath the crankcase, through the main bearings, overflowing into the crankcase.

6—All of them, it is claimed.

BRAKE HORSEPOWER OF OAKLAND**Model Nomenclature Corresponds With Showing on Brake Test**

Dayton, Ia.—Editor Motor Age—I would like to know the brake-test horsepower of the Oakland 1913 Greyhound 6-60, the model 42, and the model 35.—H. R. Bygel.

The factory claims 60 horsepower at 1,800 revolutions for the 6-60, 40 horsepower at 1,800 revolutions for the 42 and 35 horsepower for the model 35 at 1,800 revolutions per minute.

TOO MUCH OIL MAKES CASE LEAK**Operation of Diesel Engine Explained to Texas Reader**

Pecos, Tex.—Editor Motor Age—Kindly explain the principle on which the Diesel engine operates.

2—The oil in the differential housing of my car works out at the brake drums, notwithstanding the fact that I have felt washers on the axle. A mechanic advised me to drill a hole in the housing near the springs to let out the surplus oil. Is this a practical suggestion for a three-quarter floating axle?

3—Is there any harmless fuel that can be used with gasoline, benzine or naphtha to make them more explosive?—J. W. Hatcher.

Notice to Inquirers and Correspondents

Motor Age has received communications addressed to the Readers' Clearing House from the following named towns and noms de plume:

Regina, Sask.....	A Beginner
Oakland, Cal.....	J. A. H.
Milwaukee, Wis.....	Reader for Years
Oak Grove, Ala.....	A Subscriber
Milwaukee, Wis.....	A Milwaukee Chauffeur
Canton, Miss.....	Subscriber
Indianapolis, Ind.....	E. E. J.
Clarksville, Ia.....	Subscriber
Gulfport, Miss.....	S. G. E.
Woodward, Okla.....	A Subscriber
Chicago.....	Air Starter
La Porte, Ind.....	F. W. M.
.....	Student
North Lawrence, O.....	Amateur
Peoria, Ill.....	William
Rock Rapids, Ia.....	A Reader

These communications will be held until the proper signatures have been received. All communications written over a nom de plume must bear the writer's signature, otherwise such communications will not be answered. These signatures are wanted as proof of the authenticity of the inquiries.—Editor Motor Age.

1—Briefly, the Diesel engine is an internal combustion motor that operates on the same general principle as the familiar type, but differs in that the compression is much higher, and in that no electric ignition is used and no carbureter. Instead of these, the fuel is injected directly into the cylinder in the liquid state, under pressure; being ignited by the heat of the highly compressed air. The compression of the Diesel engine usually is from 450 to 500 pounds to the square inch, which generates heat in excess of the flash-point of the liquid fuel. The liquid is instantly vaporized by the heat.

Diesel engines operate on both the two-stroke cycle and the four-stroke cycle. In the four-cycle type on the suction stroke, pure air is drawn into the cylinder and compressed to about 500 pounds pressure. At the top of the compression stroke a charge of fuel, usually the crudest and cheapest of oils, is injected under pressure. The heat ignites it and it forces the piston down. On the exhaust stroke, the piston forces the burned gases out through the usual exhaust valve. In the two-cycle type, the down stroke of the piston is the working stroke in every revolution. When the piston reaches the bottom of its stroke it uncovers an exhaust port at one side, and an air port on the other. Air under pressure is sent through the cylinder, driving the burned gases out and filling the cylinder. On the upstroke this air is compressed, as in the four-cycle type.

2—If oil leaks from an axle which is properly gasketed with felt washers, it is because the oil is under pressure. This pressure is due to the churning action of the gears, to the gases generated by the action of the parts, and to heat generated by friction. The gaskets should be sufficient to retain the oil under normal pressure, and the fact that they do not retain the oil indicates that either the pressure is greater than normal, or that too much oil is used. To fit open drains on the housing might suffice to keep the level below a certain maximum, but besides this, they would permit too much oil to drain and would admit water, dust and dirt. If there is too much oil in the axle, it is a simple matter to take some out. It is also easy to measure the amount of oil put in, to insure against a surplus. If there is an excess of pressure in the axle, it is the result of friction. This friction must be more than normal, and hence due to badly meshing gears, misaligned shafts, or bearings in poor condition. The remedy is to overhaul the axle and put it in first rate condition. If the friction is due to a slight defect in the parts, such as an out-of-roundness of the crown gear, which is not deemed sufficiently serious to warrant replacement, but which does increase the pressure to the extent of forcing the oil past the gaskets, the remedy is to apply a breather on the axle. This breather should be

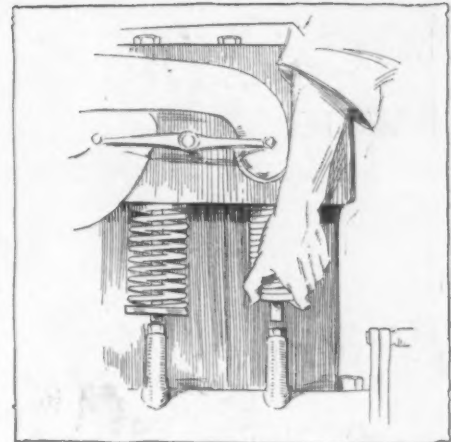


FIG. 2—HOLDING UP VALVE WITH MOTOR RUNNING

of such form as to exclude water and dirt, and should be so placed that there will be no danger of oil leakage.

3—No; ether makes starting easier but does not increase the power. Picric acid increases the power but is harmful to the motor and dangerous to the operator.

A VALVE SLAP BOTHERS GOPHER**How to Determine a Noisy Valve—Felt Washers Useful**

Biscail, Minn.—Editor Motor Age—When on the road my Ford pounds very much on one valve. I have tried a card to find the valve, but they all seem to be properly adjusted. How can I find the valve?

Can I use a felt boot, as advised, and where can I get it?—F. Kolar.

Perhaps the valve is loose in the guide. If this is the case, the valve will slap against the guide and cause the noise to be heard. The adjustment of the tappet should be made with some thought of metal expansion. Tappet adjustment is best done while the engine is hot and running, for if adjusted when cold the expansion of the metal will take up some of the clearance. The best method for determining the noisy valve is this: Let the engine run so that the noise is heard and then grip each valve spring firmly and pull it up with the hand against spring tension, as shown in Fig. 2, so that the valve is not active. This is equivalent to running the engine with seven valves. Each valve should be lifted in this way and when the noise disappears, the noisy valve is the one which is being held.

Felt washers may be obtained at any supply store.

IS INTERESTED IN CARBURETERS**Specifications of 1913 Car Desired—Number of Cars in New York**

Hoosac, N. Y.—Editor Motor Age—What cars are equipped with the Holley carbureter?

2—What cars are equipped with the Rayfield carbureter?

3—Give me the specifications of the Rambler Cross Country for 1913, namely, horsepower, carbureter, rear axle, self-starter, price, etc.

4—Where can I obtain a book, giving the number of motor cars in the state of New York in numerical order and the names of the owners, and what is the price?—L. S. A.

1, 2 and 3—This is given in the table of specifications of 1913 cars published January 9, 1913.

4—Write to the secretary of state at Albany, N. Y.

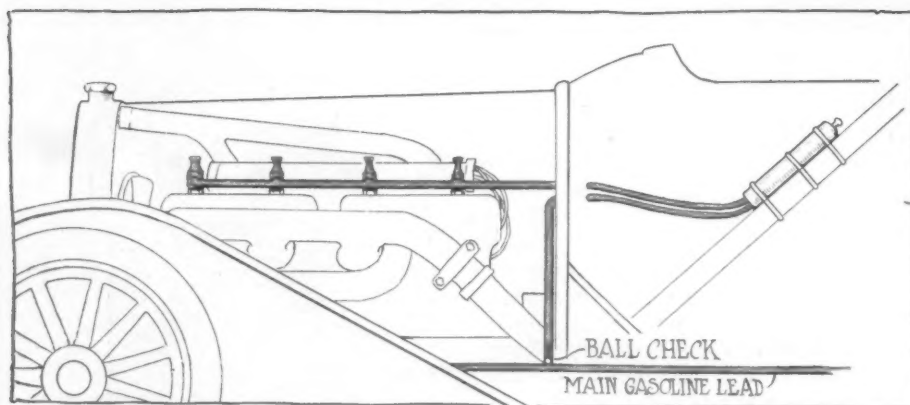


FIG. 3--READER'S DESIGN OF GASOLINE PRIMER

GIVES DESIGN FOR GAS PRIMER**Plain Sight Feed Not Sufficient—Pressure Required for Primer**

Winnetka, Ill.—Editor Motor Age—Kindly inform me if it would be possible to install the priming device herewith described and illustrated in Fig. 3 to produce desired results. The spark plugs to be the Disco plugs illustrated in Motor Age February 13th, page 39, having priming ducts and a ball check contained in the mouth of the duct, the pipe tapping the main gasoline lead to have a ball check so that on the down stroke of the priming pump the gasoline has to follow the lead to the plugs.

2—Would an ordinary glass oil sight feed cup on the dash, instead of a pump and lead from the gasoline line be practical? I mean, would the gasoline flow from the oil cup when the engine was revolved, or would pressure be required to inject the priming charge into the cylinder?

3—I have a car that weighs about 3,000 lbs. I am building a driveway, 4 inches cinders, 4 inches No. 4 crushed stone and 1 inch fine screenings, binding same with water. Is this a sufficiently strong driveway for my car?—Edgar Stanton.

1—Yes.

2—Pressure would be required.

3—Yes, it will stand 8000 pounds per square foot, approximately.

AIR-COOLED MOTOR OVERHEATS**Regrinding of Worn Cylinders Deemed Advisable Here**

Hendricks, Minn.—Editor Motor Age—I have a Santos-Dumont air-cooled engine which heats. Do you think it would work all right if the cylinders were reground? They leak now and take so much gas to run them.—E. W. Stern.

Regrinding would no doubt result satisfactorily.

HEAVIER TIRES BECOME THE RULE**Minnesotan Believes Agitation in Motor Age Responsible**

Sauk Center, Minn.—Editor Motor Age—A little kicking now and then sometimes brings its reward, for such seems to have been the result of our kicks some months ago on the number of plies in tires. I note with much pleasure that a number of the leading makers have taken notice, at least their advertisements show much tendency to make heavier tires, as per the notations following:

Two makers illustrate sections of their tires with seven-ply of fabric and two-ply of fabric on the tread, making nine-ply on the tread of their tires, with an increased weight of about 2 pounds. These same makers place nine plies on the clinch, which make a fine tire, indeed.

One maker places six plies on the tread, one-ply breaker strip, with an extra heavy rubber tread, very thick and strong from tough rubber, while another maker places seven plies on the entire tire with a very heavy breaker strip, and extra heavy rubber on the tread, which makes an ideal tire for pleasure work. Still another company advertises an extra thick tire all round, with very heavy tread, and asking a much higher price for it than for the regular or standard tire we usually find on the market.

This would indicate that makers are slowly considering our demands for more durable tires and even though we pay additional prices therefor, they will be cheapest in the end. I am positive that this is a move in the right direction. In support of this statement note the immense increase in the number of heavy inner-liner concerns, and even some tire makers are adding fine, heavy inner-liners to their lists of tires, which would appear as proof of my assertion.

I have before me several samples of tires made by leading makers and the very best of these samples has only six-ply with two-ply of breaker strip, while the others have only five plies with one-ply breaker strip, and these are all 4-inch tires with one exception, which is a 4½-inch. All of these samples were made 2 years ago. This also proves that we are progressing a little with the tire problem.—A. D. Carpenter.

WANTS ALLOWABLE PISTON SPEED**Talbot Motor Had Rate of 2,751 Feet per Minute Travel**

Reno, Nev.—Editor Motor Age—Please tell me what the maximum allowable piston speed for motor cars is at the present time. Three years ago 1,000 feet per minute was considered as fast as the pistons should be made to turn. Has this speed been increased in the present-day machine, or is the increase, which is used in some cars, a bad construction?—Thomas J. Olsen.

This is discussed in the Readers' Clearing House in Motor Age, issue of March 6, page 29. The 25-horsepower Talbot which broke the world's record for 1 hour's time recently turned over at a speed of 3,000 revolutions per minute. With its stroke of 5½ inches, its piston speed was 2,751 feet per minute, at 3,000 revolutions.

MISS FROM PLAY IN MAGNETO**Worn Coupling of Ignition Instrument Cause of Break**

Lizton, Ind.—Editor Motor Age—I have been having trouble with my 1911 model L Richmond which is equipped with a Kingston carburetor and Michigan magneto. I have just overhauled the motor and everything seems to be in very good shape with the exception of wear in some places. There seems to be sufficient play in the magneto-shaft coupling to make and break the circuit. Could this cause the motor to miss? It misses often when the motor is not pulling very hard or when the gasoline is not fed with great care, but when the motor is pulling hard and is not running very fast it never misses and can pull almost any hill on high speed.

The carburetor has no hot-air pipe attachment, and when the motor is started frost will gather on the intake pipe until it is white; but when the motor warms up it disappears. The carburetor has only the gasoline adjustment and I have been unable to adjust it without its missing when the throttle is suddenly opened.

The motor had no power or speed before I overhauled it; I ran it on second speed almost all of the time and on first on every hill, and it would miss almost constantly, sometimes running on two cylinders, sometimes on three, but not very often on four. I smoothed the contact points with emery paper and had magneto tested; the wiring seems all right. The compression is all right, valve timing is correct; in fact, I am unable to find anything wrong. I believe the trouble is with the carburetor, and unless it is equipped with a hot-air pipe I do not know how to stop the motor missing.—Granville Leach.

The play in the magneto shaft will cause missing. It seems that your auxiliary air valve sticks shut. It should be adjusted to open quickly when the motor is speeded up. The frost is due to the rapid vaporization and expansion of the gasoline. It is harmless.

LOWERING FLOAT LOWERS LEVEL**Reply to Inquirer in Former Issue on Flooding an Error**

Cordova, Tex.—Editor Motor Age—From the reply to Ranger, Tex., in the issue of February 27, page 26, I quote as follows: "You state that you lowered the float. This would augment rather than remedy the difficulty." And again, "We believe that with the component parts in good order the raising of the float will lower the level and prevent flooding." Can this be true? Certainly to lower the float would lower the fuel level unless the float were submerged when it would no longer be a float. I would appreciate a diagram of a carburetor which lowers the fuel level by raising the float.—D.

This statement obviously was in error, as the lowering of the float by adjustment of the needle valve naturally seats the needle valve with the float at a lower level. The writer was considering at the time the effect of depressing the float as in priming, which floods the carburetor. The fact that the lowering of the float by adjustment has the opposite effect to its depression by means of the tickler was overlooked.

ILLUSTRATION WAS DIAGRAMMATIC**Clutch Design Not Reproduction of Existing Make of Member**

Colchester, Ill.—Will Motor Age give me the name of the clutch illustrated on page 34 of the issue of Feb. 13? Where could I procure such a clutch and what is the price?—W. R. Baumgardner.

The sectional view of the multiple disk clutch that was used in the explanation of this type, as referred to above, was not drawn from any particular make of clutch, but was simply intended as a diagram of the action of this type in general.

COAL OIL AND GASOLINE AS FUEL

Subscriber Told Mixture of Coal Oil and Gasoline Cleans Cylinders

Neodesha, Kan.—I have heard that coal oil mixed with the gasoline gives good results, both in running and keeping the engine clean. Would Motor Age recommend its use, and if so, in what proportion? Would it be all right for air-cooled engines, such as a motorcycle engine?

2—Give the latest S A E horsepower formula.—Coal Oil.

1—Motor Age has not experimented with coal oil and gasoline as fuel, and with the present type of carbureter it seems reasonable that such a mixture will not give as great efficiency as if gasoline alone were used. Kerosene has a high percentage of carbon and when used as a fuel with the ordinary carbureter tends to carbonize instead of clean the engine. There should be no distinction made between fuel for air-cooled and water-cooled motors.

2—The standard S. A. E. formula is

$$HP = \frac{D^2 N}{2.5}$$

at 1000 feet per minute piston speed, where—
D is the diameter or bore of the cylinder in inches and
N the number of cylinders.

The modified S.A.E. formula is

$$D^2 SNR$$

H.P. = ——— where

$$15000$$

$$H.P. = \frac{D^2 SNR}{15000} \text{ where}$$

D = Bore in inches.

S = Stroke in inches.

N = Number of cylinders, and

R = Revolutions per minute of crankshaft.

CANADIAN GIVEN CAR WEIGHTS

Information Regarding Maximum Speed of Three Makes of Cars

Saskatoon, Sask.—Editor Motor Age—What are the catalogued weights of the Packard 38 roadster, Pierce-Arrow roadster, and the Locomobile roadster; also the different speeds of same.—McIntosh-Vick Auto Co.

Pierce-Arrow, 38, 3,527 pounds, 60 miles per hour; Packard 38 roadster, 4,025 pounds, 50 miles per hour; Locomobile, 3,600 pounds.

GASOLINE TURBINES AND KEROSENE

Turbines Not Internal Combustion Engines—Fired Outside

Bluffton, O.—Editor Motor Age—Kindly illustrate a gasoline turbine.

2—How is the charge compressed and fired?

3—Why are not motor car engine cylinders waterjacketed their entire length, as are stationary low-speed gasoline engines?

4—Would coal oil as fuel not induce overheating, especially at high speed, as coal oil gas must be taken in hot before it will explode?—Hiram P. Steiner.

1—The Barkow turbine is illustrated in Fig. 5.

2—In the Barkow, as in most turbines, the gas is compressed and ignited outside of the turbine, the expansion pressure of the burning gases being utilized to operate the turbine just as steam is used in a steam turbine. It will be seen that both fuel and air are injected into a combustion chamber and ignited outside of the turbine proper.

3—Motor car engines are jacketed at the upper end where the greatest heating occurs. To jacket the lower part would increase the weight and expense without

an adequate return in better operation of the motor.

4—Kerosene requires a hotter engine, and the engine will run hotter than with gasoline. Those who have used it report no ill effects from overheating. The chief troubles of the use of kerosene as fuel in the ordinary gasoline engine are: hard starting, carbonization and excessive smoke.

TRANSCONTINENTAL RECORD BY REO

Number of Times Starter Operates on One Battery Charge

Hoosac, N. Y.—Editor Motor Age—What is the transcontinental record for a motor car between New York and San Francisco?

2—How many times will the cross-country Rambler self-starter start the engine without recharging?

3—Can it propel the car and, if so, how far?—L. S. A.

1—10 days, 18 hours. Record made in August, 1910, in a Reo driven by Raymond Whitcomb.

2—No tests have been reported as to the number of starts. The motor will operate for from 40-50 minutes on one charge.

3—Since the battery is charged continually by the dynamo the car is able to run for a great distance on the starter. No tests have been reported as yet.

ELECTRIC OR PNEUMATIC CRANKER

Best Type of Starting System Depends on Design of the Car

Madison, Wis.—Editor Motor Age—What has Motor Age to say for or against three-point suspension: the advantages and disadvantages of four-point suspension?

2—What are the motor sizes of Hudson 6-45 and Premier motors?

3—Does Motor Age think the air starter is as efficient as the electric?—A Reader.

1—This was discussed in Motor Age issue of October 31, 1912.

2—4.13 by 5.25 is the bore and stroke of the Hudson 6-45. The Premier dimensions are 4.00 by 5.00 inches.

3—Motor Age cannot answer the question definitely because air starters on some are highly efficient whereas electric starters on some makes show excellent results. Then again an electric starter on one car may not be a success, while an air starter will. The design of the car enters into the matter largely.

EASTERNEER WANTS GENERATOR

Size of Machine and Method of Preventing Battery Overcharge.

Brooklyn, N. Y.—Editor Motor Age—1—Kindly tell me how a motor generator should be wound to prevent overcharging of the battery?

2—How large should it be to keep a 6-volt battery charged if geared 3 to 1 to engine?

3—What speed and power would it show when running as a motor?

4—How should it be wired to the battery?—Charles J. Ohlsson.

Your questions are so indefinite that they cannot be answered with any degree of accuracy. However, a motor generator may be wound in a number of ways, each maker using the method he thinks best suited for the generator. All the questions you ask are answered in specific cases in the electric cranking story in Motor Age issue of January 30th. You will also find information in the lighting article in the same issue.

QUESTIONS ON TWO-CYCLE ENGINES

Vaporization Temperatures of Kerosene and Gasoline

Cox's Creek, Ky.—Editor Motor Age—1—Would there be any advantage in heating the gas in a two-cycle engine as it passes through the gas pump to the combustion chamber? If so, how should it be?

2—How hot must kerosene gas be to be used in a combustion engine?

3—At what temperature does gasoline and kerosene boil, and what is their ignition point?

4—Will a carbureter made for a four-cycle engine work on a two-cycle?

5—Can the reversible two-cycle engine be used on a motor car without having a reverse gear in the transmission?

6—Will a two-cycle, two-cylinder engine pull as steadily and regularly in running slow as a four-cycle, four-cylinder?

7—Is the two-cycle engine growing in favor now?—O. J. Cole.

1—No.

2—About 150 degrees Fahrenheit.

3—Gasoline vaporizes between 110 and 350 degrees Fahrenheit. Kerosene vaporizes between 300 and 500 degrees.

4—Yes.

5, 6 and 7—No.

CORRECTS ANSWER TO RANGER

Right Remedy for Flooding of Schebler Carbureter Is Given

Riverside, Cal.—Editor Motor Age—I write this with the hope that it may help "Subscriber, Ranger, Tex." who has trouble with his carbureter, as described in your February 27th issue. I have had several Schebler carbureters and after using about a year they have begun flooding.

If he will dismantle his float chamber he will find the float valve to be a brass stem with a steel cone soldered on it, as shown in Fig. 4.

This cone does not seat in an angular seat, but against the sharp edge of the aperture which is evidently drilled from below. As shown in the illustration it looks as if it seated in the aperture, but it does not, in my carbureter, at least.

On looking at the opening of this hole he will probably discover, with the use of a glass, that these edges have disintegrated, leaving interstices through which the gasoline escapes. If he will remove the cap of the float chamber, place a hollow ended punch on top of the brass valve stem and tap it lightly but sufficiently hard to press the sharp edges back even with the indentations, he may remedy the trouble as I did.—A. M. Haynes.

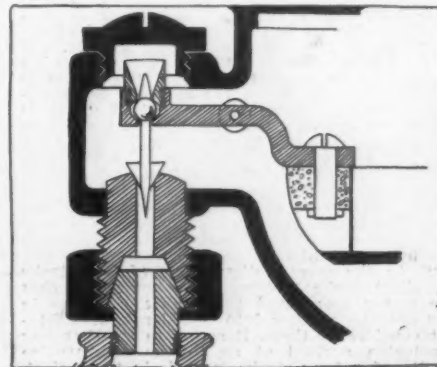


FIG. 4—ILLUSTRATING SCHEBLER FLOAT ADJUSTMENT

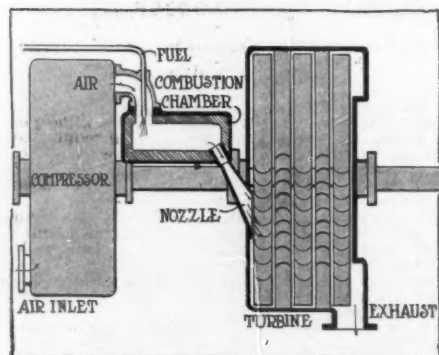


FIG. 5—BARKOW GAS TURBINE

CURRENT DEPENDS UPON VOLTAGE

Ohm's Law Used for Determining the Amperage of Coil

Wellman, Iowa—Editor Motor Age—How is it possible to get 10,000 ampere turns to the square inch when only 3 amperes is passed through the windings referred to in the apparatus Motor Age described in issue of January 23 regarding the recharging of magnets?

2—Are the rectangular cast steel pole pieces referred to hardened? If so, how hard are they made?

3—What is meant by non-magnetic brass?

4—Is cotton covered magnet wire used?

5—Single wound or double wound?

6—On page 24 of issue of Motor Age, February 20, it is stated that each coil contains $4\frac{1}{2}$ pounds B & S 20 gauge wire, or 1,200 feet. Two coils connected would make one continuous wire 2,400 feet long. Please explain how you can pass 3 amperes through current 2,400 feet of No. 20 B & S gauge wire?

7—Is it better to have an air space between coils of $\frac{1}{2}$ -inch or 3 inches—C. C. Hahn.

1—It is possible to get any number of ampere turns to the square inch, for the ampere turns equal the number of amperes times the number turns. Therefore if 3 amperes is flowing through the winding then there will be 3,333 turns of wire.

2—The pole pieces are not hardened.

3, 4 and 5—Brass is non-magnetic. Non-magnetic means that it is not attracted by magnetism. Cotton-covered wire, single wound.

6—Both coils, which contain 2,400 feet of 20 gauge wire, consume a little over 3 amperes on a 120-volt circuit. A lighting circuit has for ordinary purposes an unlimited supply of current. If the electromagnet is put in the 120-volt circuit, a current of 3 amperes is drawn.

7—For the design of the electromagnet mentioned $\frac{1}{2}$ inch is best suited.

STROKE-LENGTH AND PISTON SPEED

Reader Thinks Gear Ratio Should Be Arbitrary Affair

Minneapolis, Minn.—Editor Motor Age—I have been told that a gasoline motor is most efficient when it is working at a speed of approximately 800 revolutions per minute. If this is true, should not the gear ratio of a motor car be such that when the motor is working at that speed, the car will be traveling at the average rate of speed at which it is usually driven? For example: I drive at an average speed of say 20 miles an hour. Now, if the greatest efficiency of a motor is obtained at 775 to 810—to be exact—revolutions per minute, should the gear ratio of my car be such that, at this motor speed, my car would be traveling 20 miles an hour? It may be taken for granted that good, level roads are being considered.

2—In the several discussions of long-stroke vs. short-stroke motors, I do not recall that the motor speed and the gear ratio have in any case been taken into consideration. Without considering them, it seems to me that any conclusion arrived at as to the comparative merits of a long stroke is entirely theoretical. It also seems to me that the true function of a long-stroke motor is not realized in a car having a low gear ratio, say $3\frac{1}{4}$, or 4 to 1,

which means high speed for the pistons. More power is unquestionably obtained by lengthening the stroke but retaining the same bore; but is not a slower piston speed also desirable as the stroke is lengthened?—Rollin E. Smith.

1—It is not fair to take an arbitrary motor speed as the normal speed of all motors, as this will vary with every different motor, while there will be a radical variance in different types of construction. You are right in your statement that the gear ratio should be such that the engine would operate at its most advantageous crankshaft speed at the average road speed at which the car is driven. This provided that there is a sufficient range of motor speed above this figure to permit of high speeds when the occasion arises and power for the hills, when the car speed must be slow, in high gear.

The maximum speed at which the car is to be driven determines to a large measure the speed at which the motor will run in normal driving. For instance, if the maximum speed of the car is placed at 60 miles per hour and the motor produces its maximum power at 1500 revolutions per minute; assuming a car with 36-inch wheels, the gear ratio would have to be 3.2 to 1.

Now, with the gear ratio at 3.2 to 1, at 800 revolutions per minute the car would be running at a speed of 28 miles per hour. This is not the normal driving speed, which you place at 20 miles per hour, and to alter the gear ratio to bring the car speed down to this speed, would limit the speed to 50 miles per hour. It would be possible to design a motor car and engine with such a relation between the wheel diameter, gear ratio, and normal engine speeds that your ideal condition would obtain without impairing the efficiency of the car at higher and lower speeds, but whether the figure 800 revolutions would be right or wrong would depend altogether upon the individual motor.

2—Gear ratio primarily has nothing to do with the discussion of the relative efficiency or advantages of the long-stroke and the short-stroke motor. Motor speed has a great deal to do with the subject, if you will look up the past discussions on the question, you will find it has not been overlooked. The gear ratio, however, would depend upon the motor speed.

But rotative and piston speed is governed by the strength of materials, lubrication, and cooling. Since there is a limit to the strength of materials, lubrication, and cooling of an engine, then there is a limit to the piston speed. It is conceded now that long-stroke motors may be run at as high a rotative speed as short-stroke motors of equal displacement.

The life of an engine is governed by its piston speed. The piston of the long-stroke engine being shorter, usually, and subject to the same amount of friction, naturally will wear faster than the short-stroke engine. But the short-stroke engine gets greater pressure on the bearings, therefore the bearings will wear faster

than those of the long-stroke. If the speed of the long-stroke engine is cut down and the bearing surface of the short-stroke engine increased, then both engines, granting that they have the same displacement, etc., will have approximately the same useful life. You are correct then in assuming that the long-stroke engine should have a slow piston speed, for then the life is increased.

LOWEST AND HIGHEST PRESSURES

Compression Pressures in Average Motors

—Velocity Indefinite

Chicago, Ill.—Editor Motor Age—What is the minimum compression pressure per square inch which may be successfully used in motor car engine practice? Also the maximum. Denote whether the pressure is gauge or absolute.

2—What is the velocity of a column of gas having a sectional area of 1 square inch in feet per minute when under pressure of 4 pounds, 6 pounds, 8 pounds, 12 pounds?

3—What authority and formula was used in the above in determining the result?—H. L. Magill.

1—About 50 pounds per square inch for the minimum and 85 for the maximum, both gauge pressure. Few reach this maximum; the average is between 60 and 65 pounds per square inch.

2 and 3—Your question is not clear. The velocity with which a gas will escape into a vacuum is inversely proportional to the square root of its density. You do not mention the kind of gas. An example may help. Oxygen which has a density 16 times greater than hydrogen, would under the same conditions escape through an opening one fourth as fast as the latter gas according to Kent. If you will name a definite gas and tell exactly under what conditions you are working the matter may be cleared up.

IGNITION TROUBLES ON A TRACTOR

Output of Ford Magneto—Another Electromagnet Inquiry

Neillsville, Wis.—Editor Motor Age—What is the address of the Chicago Auto Supply Co.?

2—Is a condenser used on all coils or only upon vibrator coils?

3—Please explain the principle of the condenser and how connected upon coils?

4—Some time ago I had trouble with a K-W high-tension magneto mounted upon a Big Four gas tractor. The engine refused to start because we could not get a spark at any one of the spark plugs, so the plugs, wiring, contact make-and-break, and all connections were examined without finding the trouble. Then the magneto was taken off the motor and I found that by giving the armature shaft a quick turn with the hand I could get a fat spark at the safety gap in the magneto. I then connected one end of a wire to the high-tension distributor terminal and held the other end within 1-32 inch from the magneto and by turning the shaft I could also get a good spark here, which proved that the distributor was in perfect condition, yet when the magneto was replaced I could not get a spark at any one of the spark plugs, nor in the safety gap. There was no water or oil in the magneto, the armature shaft was true and its bearings were in good condition, the coupling on the armature shaft did not bind in any way and was clean and free from dirt, as was also the base the magneto was mounted upon. The current seemed to short-circuit in some manner.

5—Is there any system to test the winding of an armature in a magneto?

6—Please explain full details for recharging magneto magnets.—A Subscriber.

1—1355 South Michigan avenue, Chicago, Ill.

2—All coils.

3—This is explained fully on page 41 in Motor Age of February 13, 1913.

4—Excess of play in the distributor

shaft would cause such a condition to obtain.

5—You do not state whether the armature is to be tested for efficiency, poor insulation, etc. Each factory has its own method of testing for efficiency. Such a test could not very well be performed by anyone but the factory. The usual method is this: The armature has a known number of turns of a certain kind of wire. The magnetic flux across the pole pieces is known. Then the output of the armature at a certain number of revolutions is measured. If it does not come up to the standard efficiency the armature is taken apart and inspected, for insulation breaks or wire breaks. Since the output of a magneto is dependent primarily upon two things—the speed of the armature and the strength of the magnetic field—any inefficiency on the part of the magneto may be traced. For example, if at 1,000 revolutions per minute a magneto was supposed to generate 200 watts and a test showed this to be only 150, the first step would be to recalculate the strength of flux. If this was found correct, then the armature would be taken apart and carefully inspected.

6—A method was given in Motor Age February 13, 1913.

CYLINDER OIL AND KEROSENE Mixture Not a Successful Non-Freezing Solution for Motor

Akron, Ia.—Editor Motor Age—Many motorists in this vicinity are using cylinder oil and kerosene, half and half, as an anti-freeze mixture, will this in any way injure the engine except the rubber hose?

2—Can the camshaft bearings be adjusted on a 1909 Cadillac 30 and how?

3—What can gasoline be bought for on the oil fields of Kansas?

4—We are having trouble with our carburetor on 1909 Cadillac—it will not idle slowly; how should it be adjusted to do so?—Conrad Johnson.

1—Yes, through overheating. Heavy oils and kerosene are not good conductors of heat, and unless their use as cooling agents is confined to very cold weather, the results are liable to prove as expensive as running with an empty radiator. The injury to the hose connections, too, is annoying, although not menacing. Mixtures of alcohol and glycerine in the following proportions are to be advised:

At 15 degrees above zero—8 parts water, 1 part alcohol, 1 part glycerine.

At 8 degrees above zero—6 parts water, 1 part alcohol, 1 part glycerine.

At 10 degrees below zero—5 parts water, 2 parts alcohol, 1 part glycerine.

At 20 degrees below zero—1 part water, 2 parts alcohol, 1 part glycerine.

READER CURED CHOKING MOTOR Found Burned Brush and Rough Fiber on Commutator the Cause

Lake City, Minn.—Editor Motor Age—I have had trouble all winter with my 1912 four-passenger Marmon and just located the trouble. The car would not run well at times and then it would choke, miss, and dirty up my plugs. After it warmed up it seemed to work well until I increased the speed or went over a bump, then it would begin missing. I bought new wiring, a new carburetor and had the valves reground, but nothing

seemed to help. Finally, I took the Bosch magneto off and found one brush burned and a rough fiber on the commutator. Turning this out and fixing the brushes remedied the trouble. Maybe, this information will be of assistance to a fellow motorist who might have similar trouble.—Reader.

LOSES GREASE FROM TIMING CASE Packing at Pump-Shaft Ends Requires Attention

St. Louis, Mo.—Editor Motor Age—I have a great deal of trouble with the grease in my 1912 E-M-F car leaking out of the timing gear case. This occurs at the front and rear at the pumpshaft. What is the cause of this, and its remedy?—J. B. Halpin.

The pumpshaft ends are packed with asbestos rope soaked in graphite. The leak is due evidently to the packing being in poor condition. Replacing the packing no doubt will cure the leak. The asbestos rope may be obtained at almost any supply store. This rope should be saturated with graphite made liquid by the addition of some oil.

HOT JACKET REMEDIES STARTING Water or Air Aids in Picking Up, But Not in Initial Starting

Frederika, Ia.—Editor Motor Age—I notice in cold weather that it is more difficult to get my Schebler carburetor set so that it will not miss and clean up all the gasoline. I understand on some makes of cars they have what they term the high water-jacket on the Schebler model L which, it is claimed, helps to vaporize the gasoline in winter. Does this jacket arrangement give good satisfaction in winter?

I would think that a high water-jacket, or good hot water or any anti-freeze would help to remedy this, as it would seem that in very cold weather it would be almost impossible to get a carburetor too warm. I understand that they heat them, but as a rule do they have the hot water pipes to the carburetor large enough for good service in very cold weather?—Charles Golding.

The hard starting in winter is due to the fact that the gasoline does not vaporize readily. Any method which will warm up the fuel will help the condition. The hot-water jacket gives satisfaction, but often the hot-water pipe is too small for efficient service.

DOUBTING THOMAS ON LONGSTROKE Reason For Greater Expansion of Gas In Long-Stroke Motor

Mexico, Mo.—Editor Motor Age—In a recent issue of Motor Age was given as one of the advantages of the long-stroke over the short that the long-stroke expanded the gas further.

1—If the editor believes this, will Motor Age kindly explain how it is true that a long-stroke can get any more expansion from the same amount of gas.

2—Who is the designer of the White cars and what make of foreign car was it that the White company experimented with before designing their gasoline car?—Subscriber.

1—The action is similar to the use of a short-barreled pistol or a long-barreled gun. The expanding gases act on the bullet for a greater distance in the case of the long gun and it carries farther than does the short one.

2—Roland White is credited with being chiefly responsible for the White design. The factory engineers spent some time in Europe examining a number of foreign cars, but did not confine their attention to any one car.

ATOMIZING SECRET OF KEROSENE Mechanical Methods of Carburetion Ap- plicable to Coal Oil

Brookhaven, Miss.—Editor Motor Age—I note through the columns of Motor Age the fuel question is now uppermost in the minds of users and manufacturers of motor cars. I purchased 4 gallons of gasoline the other day which cost me \$1.00. Eight years ago, when I bought my first gallon for my first car, I think I paid about 7 cents for it, and it was better gasoline than the present product. Coal oil, or kerosene, was then about 15 cents, if I remember correctly. Since that time I have kept up with the development of the motor car, and have owned several. I always found the carburetor the principal source of trouble, and though it has been improved almost to perfection for the use of the higher test gasoline, the lower quality seems to make it necessary to further develop this necessary part of the engine.

All carburetor manufacturers pride themselves upon their product because of the lack of moving parts, or because of a few moving parts. It seems that to use kerosene successfully, and really, also, the present low-grade of gasoline, the fluid must be atomized thoroughly. Atomizing a slow volatilizing fluid will expose the necessary quantity to a larger air surface, and the space of carburetion in time units of course will be decreased in proportion.

Atomizing can be done mechanically. The fluid can be reduced to almost a perfect gas by mechanical means without external heat. The necessity of choking the air passage around a carburetor nozzle so that the velocity of the air will lift the fluid from the nozzle could be dispensed with; the float and float chamber could be disposed of; the fluid tank could be located anywhere on the car without regard to gravity feed or pressure feed. The mechanical atomizer would be small, and would add more horsepower to the engine than it could consume.

What I desire to ask is, granted that such device could be made, would it be objectionable and impractical simply because the liquid is carbureted by mechanical means instead of by the suction of the engine and the velocity of the air caused thereby?

2—If a dynamo is run by the engine to furnish light and starting; thereby consuming some of the power of the engine; if a water pump is used; or an air pump to charge a storage tank for starting or inflating tires; all these devices having moving parts and wearing surfaces; why is there, if there is, a prejudice against the mechanical production of gas, or the mechanical carburetion of fuel?

3—It is not possible to mix kerosene with air so as to form an explosive gas for a gasoline engine? If this can be done by the application of heat, could it not also be done by breaking up the kerosene into atoms and admitting air to the mass of atoms? Could an engine be started on this kind of mixture?—H. Cassidy.

1 and 2—There is no reason for assuming a mechanical method of carburetion to be objectionable, if better results can be obtained by this method than are obtained at present in the ordinary way.

3—This is done in precisely this way in the Bellem motor described on pages 26 and 27 of Motor Age March 20.



The Motorist's Kindergarten

EDITOR'S NOTE—Motor Age is publishing in this department a series of non-technical explanations of the various parts of motor cars for the benefit of the reader who knows nothing about them. The subjects will be dealt with in the most elementary manner, so that the series when completed will form a simple elucidation of the car. The first article appeared October 10, 1912.

WHENEVER two surfaces rub together friction is present and this friction appears as heat. We warm our hands by rubbing them one upon the other, because by rubbing them, the friction between the hands generates heat. When a piston rubs against its cylinder, or when a shaft rubs in its bearing there is this same friction and heating. If the friction is very great, the heat increases enough to make the moving parts expand, this causes them to rub harder, increasing the friction and the heat, until, finally if the condition be not relieved, they bind and stick fast.

Friction and Heat

Metal surfaces, no matter how smooth they may be, produce friction and heat when one is moving over the other. The speed of the movement and the pressure bringing them together increases the friction. To do away with this friction, we put a thin film of oil or grease between the surfaces so that the metal parts are not in contact but each are in contact with this film that we call a lubricant. In the gasoline engine a special oil is used for lubrication of the surfaces of the cylinders and pistons and crankshaft and other bearings of the motor. This is called cylinder oil and must have certain properties which permit it to stand the high temperatures on the cylinder without losing its lubricating qualities or burning up and carbonizing the cylinder.

The primary requisite of every lubricating system is reliability; if the ignition system or the carbureter does not func-

Lubricating Systems Part I

tion properly, the motor will run irregularly or stop, without suffering the slightest injury; but if the lubrication system fails, indications of this fact often are afforded only after the bearings and cylinder have become so badly cut as to render the motor almost worthless.

In general, all lubricating systems may be classified as either non-circulating or circulating. Non-circulating systems include all those in which the oil is used but once in the motor; circulating systems include all those in which the oil is used over and over again. In non-circulating systems, a lubricator—an oil pump—supplies oil to each bearing in quantities just sufficient to replace that lost by leakage and volatilization; in circulating systems, the lubricant floods the bearings, and the overflow is collected and eventually sent back to the bearings again.

Non-Circulating Oiling

In the discussion of non-circulating systems, we shall first consider a type in which there is a gravity sight-feed to each cylinder wall and to each main crankshaft bearing, as in Fig. 47. Surplus oil on the cylinder walls is collected by oil grooves in the piston and then led through a hollow wrist-pin to the connecting rod small-end bearing, that is, the wrist-pin bearing or crankshaft bearing. The connecting rod big-end may be lubricated by its dipping into the oil-pool formed by

leakage through the main bearings, etc., but a much more reliable method is to lead oil directly to the crank pin, as in Fig. 48. This may be accomplished by drilling an oil hole from a main journal to the crank pin, thus allowing oil to be forced to the latter by centrifugal force, as at A; or a separate sight-feed may supply an oil ring on the crank, as at B. The sight-feed is simply a glass portion of the feed tubes through which the oil may be seen dropping.

Gravity Feed

To overcome the chief disadvantages of the above systems: namely, frequent cleaning and adjustment, and independence of rate of oil flow to the engine speed, the gravity cups in some cases are replaced by a mechanical force-feed lubricator. The latter, consisting essentially of an adjustable pump for each feed, is positively driven from the motor, and the rate of oil flow varies directly with the engine speed.

Under the head of non-circulating must be considered those systems of lubrication peculiar to the two-stroke cycle motor. One, Fig. 49, which for several years has been used on some of the best marine engines of this type, differs from the gravity cup system already described only by having the oil cup and its sight-feeds separate. Crankcase compression, about 4 pounds, forces oil from the large reservoir, usually placed beside the crankcase, up to the sight-feeds on top of the cylinders; from these, the feed to the various bearings is by gravity.

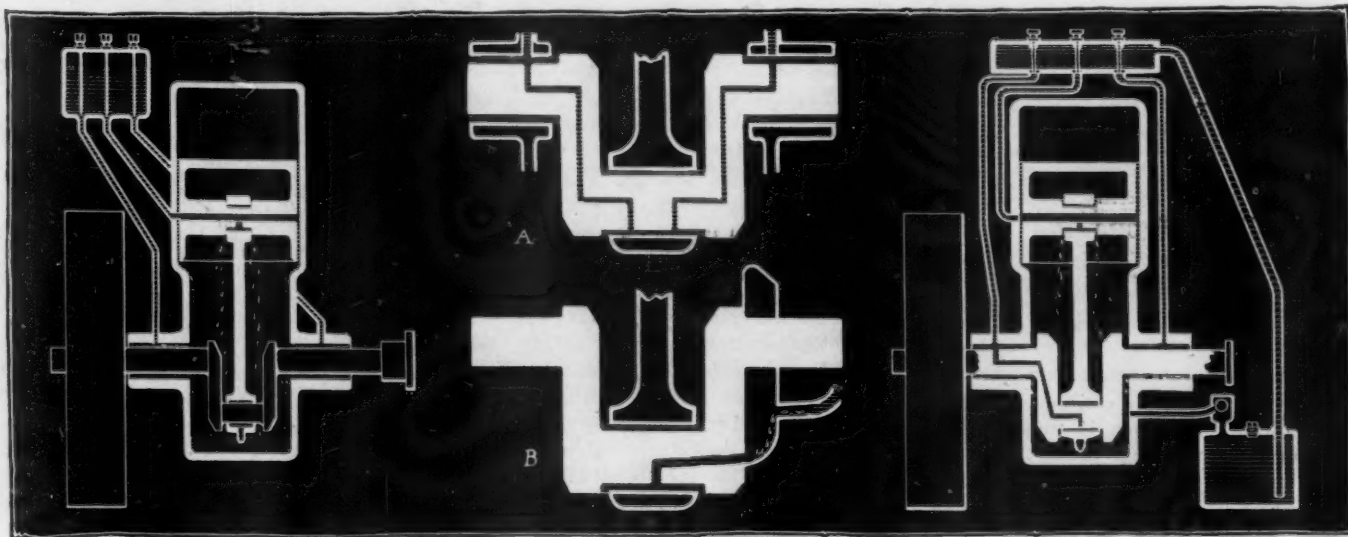


FIG. 47—GRAVITY LUBRICATION WITH CRANKCASE SPLASH

FIG. 48—TWO FORMS OF GRAVITY FEED THROUGH DRILLED CRANKSHAFT

FIG. 49—OILING A TWO-CYCLE MOTOR BY CRANKCASE COMPRESSION



VIEW OF GARAGE OF MARVIN POOL, CHICAGO. THE TWO DOORS FACE THE ALLEY. TWO CARS ARE HOUSED—ONE AN ELECTRIC



Housing the Motor Car *The Garage for the Monied Class*

AN example of compactness in private garage construction is to be noted in that owned by Marvin Pool, Chicago. This is a two-story building of terra cotta brick, about 26 by 21 feet. The owner's home is made also of terra cotta brick, thus the two correspond in appearance.

The floor plan on this page shows two entrances facing the alley. Originally the car entrance faced the rear of the house, but the inconvenience of having the car drive around the house prompted the owner to have the alley doors fitted. The entrances for the cars are 7 feet wide and about 9 feet high, thus giving ample room for the passing of a vehicle even though the top is up. On either side of the large door facing the house, is a door 3 feet wide. From these doors, as well as from the center 7-foot door, road lead to the street.

On the lower floor two cars are housed—an electric and a gasoline car. For the former a mercury-arc rectifier is provided in the corner of the garage, and the battery charging is done each night by the man in charge. In a room adjoining the rectifier is kept a supply of oil and waste together with the working clothes for the driver. A spacious washroom is next to the oil-room. Heating is by hot-water system. The boiler is contained in a room near one of the rear entrances. The hot-water pipes are overhead, thus saving

as much as possible valuable floor space.

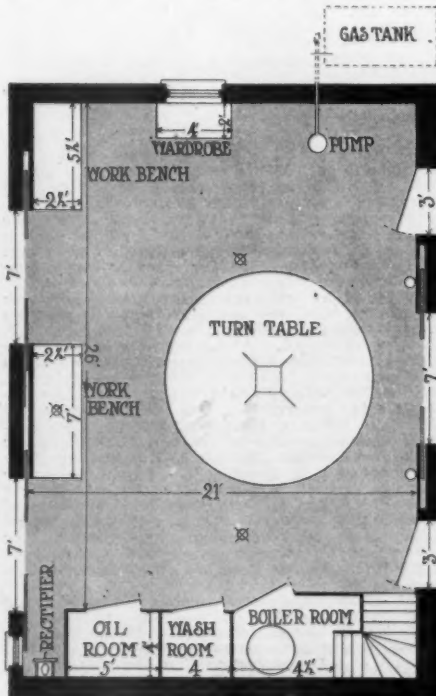
Practically every well equipped private garage has a wardrobe for the safe-keeping of robes and motoring apparel. The wardrobe in Mr. Pool's garage is of ample size to hold the motoring clothes of six

people. A window is directly above the wardrobe.

The gasoline tank is some distance away from the garage. A pipe leads to a pump in a corner of the building. Although at present two cars only are housed, there is enough floor space to accommodate four cars. A turntable in the center of the floor contains the drain. In washing, the car is placed on the turntable. There is a flange around the periphery of the turntable to prevent any water getting underneath. Lighting is by cluster lights overhead and by a number of wall brackets.

On the second floor of the building are rooms for use by the chauffeur. A telephone system has been installed, by which it is possible for the driver to get in touch with any part of the house of the owner. The doors of the garage are of the sliding type. This is almost universal in door construction, for the hinged type requires too much room for opening.

The garage floor is of concrete. Water connections are to be found near the gasoline pump. A work bench between the two alley doors is conveniently located, because that side of the building receives the greater part of the light. The doors are fitted with large windows. The garage as a whole gives a decidedly pleasing appearance because of its design and construction similar to that of the owner's dwelling in front of it.



FLOOR PLAN OF GARAGE OWNED BY MARVIN POOLE, CHICAGO

From the Four Winds

HAITI Buying Cars—Recent improvement of the streets of Port au Prince, Haiti, has resulted in the purchase of ten pleasure cars and one truck. A rapid increase in the number of cars is expected.

There Are Other Scorchers—Motor car drivers were not the only ones to be fined in the Waterbury, Conn., police court last week. The monotony of the usual grind was varied when two motormen were each fined \$100 and costs for exceeding the speed limit. The fines were imposed on the grounds that the city ordinances had been violated. A taxicab driver who had been scorching was let off with a fine of \$25 and costs.

Colored Chauffeurs Organize—With a charter membership of twenty-five, the colored chauffeurs of Buffalo, N. Y., have organized, headquarters being established at 18 Potter street, Buffalo. Only regularly employed colored chauffeurs of good moral character are eligible for membership. One of the objects of this organization is to furnish a temporary home for transient chauffeurs who otherwise might frequent questionable resorts.

Missouri to Buy Governor a Car—Unless Governor Major, of Missouri, vetoes an item in the general contingent appropriation bill, which sets aside \$4,000 for a motor car for his use, he may ride in one when he chooses. This bill was offered by Senator Lysaght on March 20, and was adopted without objection. Governor Major is an enthusiastic motorist. Although he does not own a car, he has for some time been contemplating the purchase of one.

Buffalo Ruling of Interest—Chief of Police Michael F. Regan has issued orders that hereafter motorcycles with trieyele attachment for carrying merchandise will have to secure motor car licenses if they are going to run in the city of Buffalo. Several firms have been using these trieycles in place of light delivery motor cars and save license money. From this time on, says the Buffalo police chief, these motorcycles will be considered as motor cars in so far as the procuring of licenses is concerned.

Glidden 1912 Fund Returned—It was with considerable regret that Joseph I. Schwartz, the chairman of the New Orleans committee in charge of arrangements for the Glidden tour, refunded the money that had been contributed by the owners and dealers there. New Orleans raised several thousand dollars last year to entertain the A. A. A. tourists and had all arrangements made for an interesting time, when the official tour was called off. The contributions had been held to apply to the tour which was postponed to June of this year.



GOVERNORS WHO MOTOR—HANNA OF NORTH DAKOTA

GOVERNOR L. B. HANNA, the new chief executive of North Dakota, is an enthusiastic winter motorist. In spite of the fact that he lives in a state which, in the public conception, is only a short distance removed from the arctic regions, the governor finds much pleasure in the possession of a motor car during the winter months.

An ordinary amount of snow does not deter Governor Hanna from frequent long trips across the North Dakota prairies. On these spins he often is his own chauffeur and his only passenger. His car is provided with special top and curtains which shut out the biting North Dakota winds and the driving snow and the motorist always returns from his trips refreshed and better able to solve the problems which are continually confronting the man in public life.

Governor Hanna's friends tell the story of an incident which happened before he had resigned his position as congressman from North Dakota to take up the duties of the state's chief executive. A prominent North Dakota politician, who has been a firm supporter of the present governor, desired to have a certain measure introduced in the national legislature. Mr. Hanna objected to the measure and a conference between the two men was arranged.

When the politician called at the Hanna home he found the congressman's car waiting at the entrance and was invited to take a ride. It was late fall. Snow already covered the ground and the mercury was almost down to the zero mark. The congressman and his constituent set off. While between 15 and 20 miles were being covered they discussed the proposed bill. No agreement was reached and Congressman Hanna, who was driving his car, finally turned and began the homeward journey by a different route. Snow drifts began to appear and in several instances the car was almost stalled. Twice the congressman and his guest were forced to get out of the car and shovel a path for a short distance ahead. Finally the more traveled roads were reached and a short time later the car drew up at the Hanna residence.

"I guess we won't insist on that bill being entered at this session," said the politician. Later he informed other friends that his decision had been reached when Congressman Hanna and he were shoveling the snow at the last drift.

As a congressman, Governor Hanna always kept his car with him at the national capital and utilized congressional recesses for short tours in the eastern states.

The action of the American Automobile Association officials in giving up this year's tour to New Orleans was the cause of much regret in Louisiana.

Hoosiers Turn to Motoring—At a recent meeting of the directors of the Indiana Interurban Fair Association, it was decided that special prizes shall be given for the best and most grotesquely decorated motor cars. In the past the fairs held by the association have depended largely on horse racing as the principal attraction, but interest in this having waned, it was decided to arouse interest through the motor car contests. The cities included in the association besides Frankfort are Crawfordsville, Russiaville, Lebanon and Lafayette.

Co-operative Fire-Fighting Proposed—Should plans now prepared be carried out, towns surrounding Hartford, Conn., will have less fear in the future from fires. President Horace B. Clark, of the Hartford board of fire commissioners, proposes that Hartford and surrounding towns purchase motor apparatus and operate it on a co-operative basis. For instance, if Manchester, Rockville, Meriden, New Britain, Thompsonville or other surrounding towns be visited by a serious blaze and need assistance a hurry call would bring in apparatus from the assisting towns. It is possible of accomplishment only by means of motor fire equipment.

Self-Starter Race Proposed—Wayne K. Bromlee, sales manager of the Motor Car Mfg. Co. of Indianapolis, Ind., proposed a most unique contest at a Hoosier Motor Club luncheon recently. It is to be an electric self-starter race. The contestants are to be started in front of the Claypool hotel. The distance will be one city block. Each contestant must have the car in full touring trim and able to run under its own power. Further, those cars which have the starter attached to the rear of the clutch must not declutch so as to prevent turning the motor over during the contest. The contest may be pulled off the day before the 500-mile race.

Warning for Poor Drivers—Employed by a Hartford, Conn., firm a week and claiming to be a good truck driver, a 17-year-old boy claimed his right to the title by running two motor trucks out of the garage in the evening. The first car he ran into a ditch and did damage of about \$400. He then took out the second car to haul back the first and ditched that also, doing damage of about \$100. On a charge of taking the cars without leave the boy was bound over to the June term of the superior court under bonds of \$250. The statutes provide that in such cases the accused may be either sentenced to jail for 6 months or may be bound over to the higher court.

Good Roads Brevities

A BILL for the establishment of a three-headed highway commission in the state of Connecticut has been rejected in the state legislature. It was vigorously opposed throughout the state.

Alabama will invite every governor in the United States to attend a meeting of the National Good Roads Federation in Birmingham, April 24 and 25. Governor O'Neal has drafted the invitation. Arrangements are being made to entertain 2,000.

The thirteenth legislature of the state of Washington, recently closed, appropriated for state highways \$1,613,300 and for permanent, or county roads, \$3,250,000.

The proposed Cannon Ball trail between Chicago and Quincy via Kewanee has been divided into four divisions, and Dr. J. W. Heflin, of Kewanee, who is secretary of the trail association, is now receiving bids for material required to place the highway in first class-condition. It is planned to install concrete mile posts carrying direction markers.

The Peoria Automobile Club has launched a campaign to secure the proposed state road between Chicago and St. Louis via Peoria instead of via Bloomington, Ill., as has been generally planned. Peoria has the advantage of the river route with the picturesque scenery, which is not to be found along the Bloomington route. The Peoria promoters favor a road leading from Chicago to Starved Rock, thence following the Illinois river to Peoria and thence due south to St. Louis, touching Springfield, Carlinville and Alton. While the Peoria route is about 30 miles longer than via Bloomington, the more attractive scenery is counted upon to secure support. A club house, to be erected by the Peoria club, on the road between Chicago and St. Louis, is also counted upon to prove a drawing card.

Good roads legislation in the state of Washington was practically cleaned up on March 12th when the three road bills were signed by Governor Lister providing for a levy of 1½ mills and subsequent levies of 1 mill annually for the state highway funds; providing for the expenditure of this fund by making apportionments for the state roads, and the measure naming the primary highways to be built and maintained out of the state highway fund. The bill passed by the senate was the measure appropriating \$3,250,000 from the permanent or county highway fund for expenditure by the counties in the amount in which they pay into the fund.

Plans for \$20,000 to be expended on roads in Hennepin county, Minn., have been ordered by the commissioners. The amount is about one-ninth of the total appropriation. Further test of concrete material for roads is to be made by the county.

An instance of co-operation in road building between cities and rural districts is furnished by the city of Moline, Ill., and Moline township, the latter having appropriated \$5,000 for a road improvement fund. The road improvement work is to be carried on under the supervision of the city engineer of Moline. The city will furnish the labor and the material will be paid for by the county.

Governor Lister, at Olympia, Wash., has signed the bill which enables state, cities and counties to enter into agreements with other states, cities and counties in the construction of interstate bridges. The bill was designed primarily to assist Vancouver and Clarke county to join with Oregon and Multnomah county and Portland, Ore., in the construction of the Pacific highway bridge across the Columbia river.

In the latter event the boy, on failure to provide bonds, will have to remain in jail until his case comes before the June term. The case is the more significant because of the age of the accused. It is expected to establish a precedent and serve as a good warning.

Helps Find Stolen Cars—In putting into effect its secret service bureau the Columbus Automobile Club, of Columbus, O., has a unique idea, which has so far been quite a success. The club has employed William Lester and his detective bureau to take care of all thefts of cars or contents from club members, without any cost excepting the necessary transportation charges when the detectives are called out of the city. In carrying out the plan all members have been asked to fill out blanks, showing residence and other addresses, make and model of car, number of state license, kind of motive power, horsepower, manufacturer's number, style of car, color of paint, kind of top, size of tires, wheel base, seating capacity and contents and list of accessories. This information is kept on file at the clubrooms.

Coming Motor Events

SHOWS

March 24-29.....Indianapolis, Ind.
March 27-April 3.....Quincy, Ill.
March 31-April 5.....Deadwood, S. D.
April 1-6.....San Francisco, Cal.
April 5-12.....Pittsburgh, Pa.
April 13-19, Pittsburgh, Pa., Commercial show
October.....Paris salon

CONTESTS

April 14-16—Truck run, Chicago Motor Club, Chicago.
April 27—Hill-climb, Limonest, France.
April 29-May 2—Reliability, Columbus Automobile Club, Columbus, O.
*May 5-8—Truck reliability of Washington Post, Washington, D. C.
May 11-12—Targa Florio road race, Sicily.
May 14-15—West Hudson and Catskill tour.
May 30—Interclub reliability, Chicago Motor Club-Illinois A. C.
*May 30—Indianapolis speedway meet.

MEETINGS

June 5-7—Mid-summer meeting S. A. F., Detroit.
June 21—Algonquin hill-climb, Algonquin, Ill.
June 23-28—International road congress, London, Eng.
*June 25-29—Chicago Automobile Club reliability to Boston, Mass.
July 1—Indianapolis to Pacific coast tour; promoted by Indiana Automobile Manufacturers' Association.
July 1-16—Motor plow competition, Winnipeg, Can.
July 4—Track meet, Taylor, Tex.
July 4-6—Road race, Tacoma, Wash.
July 12—French grand prix.
July 11-19—A. A. A. endurance run, Minneapolis to Glacier Park, Mont.
*July 27-28—Tacoma, Wash., road race.
August—Elgin road races.
August 30-September 6—Reliability run, Chicago Motor Club.
September 1—200-mile track race, Columbus, O.
September 21—French light-car road race, Boulogne.
September 25—Tourist trophy stock-car road race, Isle of Man, Great Britain.
October 4—Start of Chicago Motor Club's around Lake Michigan reliability.
*November 24—Vanderbilt road race at Savannah, Ga.
November 27—Savannah grand prix. Sanctioned by A. C. A.

*Sanctioned by A. A. A.

Recent Club Happenings

THE Milwaukee Automobile Club intends to open its \$25,000 country clubhouse, 4 miles west of Milwaukee, for the 1913 season on April 15 or 20. To add to the attractiveness of the clubhouse tennis courts are being laid out and several rooms of the clubhouse are being decorated in college style, which is particularly attractive.

Fifty motorists of River Falls, Wis., and vicinity have organized a strong motor club, which intends to prosecute highway improvement, induce permanent road work under state aid, and promote sociability. Officers have been elected as follows: President, Dr. R. U. Cairns; vice-president, John Chapman; secretary, R. W. Freeman, and treasurer, George Dodge. Headquarters will be in River Falls.

The Benson, Minn., Automobile Club has elected officers as follows: President, J. N. Edwards; secretary, I. M. Hudson; treasurer, Oliver Sorland. A new feature was the formation of a guaranty fund by the club to get at once at least one carload of registered cattle to be auctioned to the farmers at Benson at their own bids. The fund will cover any possible loss.

Uniform road markers are desired by members of the Automobile Club of Hartford, Conn. The matter is now being threshed out, and a report will be made within the next 2 weeks at a meeting of the club as to what is favored.

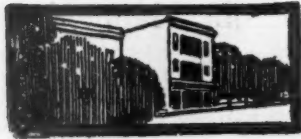
Officers for the Tangipahoa Parish Automobile Association, Louisiana, have been elected as follows: James Jumonville, president; G. H. Burnham, secretary; J. S. Foley, treasurer.

Steps toward the immediate posting of dangerous points, securing the co-operation of the chief of police for the better regulation of traffic and a vote to endorse the \$200,000 bond for permanent pavements bill now before the Connecticut legislature, were topics of discussion before the Automobile Club of New Haven last week. There are a number of dangerous spots in New Haven where accidents are likely to occur and to prevent such the club desires suitable signs of warning placed. A scheme which has worked out well among the club members is the filing of road data, regarding bad spots, improvements, detours and the like. By means of this data the club is kept informed on state conditions.

The directors of the Ontario Motor League of the province of Ontario, Canada, at special meeting recently passed a resolution declaring that a rigid system of examination should be adopted by Canadian government for chauffeurs driving for hire, payment or gain. It is claimed by this organization that exile and outlaw chauffeurs, those that are unable to secure licenses in the states or Europe, or those who have lost their licenses because they stole other cars for joy rides, etc., are flocking into Ontario for employment, because in the province it is unnecessary for them to pass provincial examination before securing necessary license to drive in the dominion.

As result of recent membership campaign conducted by Ontario Motor League of Canada, 901 new motorists were added to the rolls of that organization, making the total membership 3,163, of which 2,100 reside in Toronto, Ont. A. K. C. Visick, of Toronto, was winner of individual canvass, having secured eighty-one new members. He captured the winning team.

The Grand Rapids Automobile Club will formally open its new club house on the river road near Plainfield, Mich., about May 1. The structure is practically finished, except for the interior work and finishing. A house warming will be given.



Among the Makers and Dealers



PENNUMAN Joins Walpole—I. W. Pennuman is now the New England sales manager for the Walpole Tire and Rubber Co., with sales offices at 757 Boylston street, Boston. He was previously with the Goodyear Tire and Rubber Co., at one time assistant manager of the New England territory, and for the last 4 years he has been branch manager at Portland.

American Officials Re-elected—At their regular annual meeting, held at the plant in Indianapolis, recently, the stockholders of the American Motors Co. honored the leaders of the firm by re-election. The entire board of directors and the following officials were named to succeed themselves: V. A. Longaker, chairman of board and general manager; J. I. Handley, president; D. S. Menasco, vice-president; J. D. Bright, treasurer.

McCue Granted Drawback—A ruling has been made by the treasury department at Washington that drawback shall be allowed under section 25 of the tariff act of 1909, on motor car axles manufactured by the McCue Co., of Buffalo, N. Y., with the use of imported annular bearings. The drawback allowance shall not exceed the number of bearings appearing in the exported axles as shown by the sworn statement of the manufacturers, filed with the collector of customs at Buffalo.

May Move to Racine—The report that the Aluminum Castings Co., of Cleveland, O., would move its main western plant, now located at Manitowoc, Wis., to Racine, Wis., seems to be substantiated by orders given to Racine realty men to negotiate for a site, and to contractors to make estimates for the construction of foundry

buildings. The Manitowoc plant has been closed for a month because of unfavorable labor and transportation facilities. By moving the works to Racine the company would be in the midst of its market and have excellent facilities for shipping the surplus product.

Trying Out New Kissel—The first car built at the new Milwaukee works of the Kissel Motor Car Co., of Hartford, Wis., is now on its way across the western half of America for a thorough try-out at the hands of G. A. Kissel, president of the company, who with Mrs. Kissel plans to spend 2 or 3 months in touring the Pacific coast and mountain states. The car is of 48 horsepower and the Milwaukee works are being devoted exclusively to a run on this type for the present.

Drawback for Reo—The treasury department at Washington has made a ruling to the effect that drawback will be allowed under section 25 of the tariff act of 1909, and the regulations promulgated thereunder on motor cars manufactured by the Reo Motor Car Co., Lansing, Mich., with the use of imported tires. The drawback allowance shall not exceed four tires to each motor car exported. The makers' sworn statement has been filed with the collector of customs at Detroit.

Buys Into Pumpelly Company—A half interest in the Pumpelly Battery Co., of Indianapolis, has been purchased by Sidney W. Elston, who becomes secretary and treasurer of the company. The company has been reorganized under the same name and has been incorporated with an authorized capitalization of \$20,000. Mr. Elston held the first motor car agency in Indian-

apolis. Until a few months ago he was general manager of the Indiana Auto Co., which has since gone out of business. In the reorganization of the Pumpelly Battery Co., Harry Murphy becomes president and James K. Pumpelly vice-president and chief engineer.

New Electric Company—Louis H. Hamilton and Chester H. Beach, until March 1 principal stockholders in the Hamilton-Beach Mfg. Co., of Racine, electrical specialties, have organized a new company, styled the Wisconsin Electric Co., with a capital of \$50,000, to manufacture a line of electrically-operated labor-saving devices and instruments. Large floor space has been leased in the former Racine-Sattley carriage works at Racine and 100 men will be employed from the beginning. Mr. Beach will have charge of the manufacturing and Mr. Hamilton of the marketing.

Wants Cole Stock Back—Lee Watson, of Texas, has brought suit in the Indianapolis courts against J. J. Cole, S. J. Kuqua and J. Frank Morrison, asking that a transfer of 165 shares of stock in the Cole Motor Car Co. he made to them in September, 1910, be set aside. He also asks that he be allowed back dividends and that the court fix the price he shall pay for the stock he sold. In his complaint Watson alleges he sold the stock for \$17,500 as the result of misrepresentations made concerning the condition of the company, but that shortly after the transfer a dividend of 30 per cent was declared. Mr. Kuqua says Watson knew the condition of the company when the sale was made and that there were no misrepresentations to him.

Albany, N. Y.—Montauk Motor Co., capital stock, \$10,000; incorporators, L. F. Ohse, James Webber, M. Foster.

Asheville, N. C.—Lyerly Motor Co., capital stock, \$15,000; incorporators, D. K. Lyerly, W. K. Lyerly, P. H. Lyerly.

Augusta, Me.—Harbark Auto Heater Co., capital stock, \$300,000; incorporators, C. L. Andrews, L. J. Coleman, R. S. Buzzell, E. M. Hussey, E. M. Leavitt.

Boston, Mass.—American Ignition Co., capital stock, \$10,000; to manufacture devices for ignition; incorporators, A. F. Richards, P. Catino, F. Leveroni.

Boston, Mass.—Consumers' Auto League, capital stock, \$50,000; directors, G. A. Ham, R. H. Willard, H. H. Ham.

Boston, Mass.—Mitchell & Smith, capital stock, \$10,000; motor car supplies; directors, F. R. Mitchell, W. E. Smith, A. E. Smith.

Boston, Mass.—United States Motor Vehicle Association, capital stock, \$50,000; directors, W. F. Smith, H. C. Morse, C. H. Poole.

Boston, Mass.—Westcott Motors Co., capital stock, \$5,000; directors, G. H. Learnard, H. L. Kemp, C. H. Poole.

Brooklyn, N. Y.—John Hann Co., capital stock, \$25,000; to manufacture gasoline engines; incorporators, J. Hann, D. Douglas, F. J. Waters.

Chicago—Auto Combination Mfg. Co., capital stock, \$50,000; to manufacture supplies; incorporators, H. M. Snow, G. W. Nevins, W. J. Liddy.

Denver, Colo.—Washington Motor Car Co., capital stock, \$300,000; incorporators, W. F. P. Lofland, W. I. N. Lofland, J. S. Collins, Jr.

East Liverpool, O.—Morgan & Marshall Co-Operative Tire and Rubber Co., capital stock, \$500,000; to manufacture motor cars; incorporators, R. J. Marshall, Morgan Howell, and others.

Fall River, Mass.—David M. Connell Co., capital stock, \$5,000; directors, W. H. V. Connell, D. M. Connell, C. E. Connell.

Recent Incorporations

Findlay, O.—U. S. Auto Lock Co., capital stock, \$15,000; to manufacture and deal in locks; incorporators, J. S. Van Tassel, E. B. Brokaw, J. H. Macklin, J. R. Harnahan, G. F. Burnap.

Jersey City, N. J.—Robinson, Lewis Co., capital stock, \$25,000; general motor car business; incorporators, G. H. E. Robinson, R. V. O. Lewis, J. C. Delatash.

Lynn, Mass.—Atlantic Auto Co., capital stock, \$10,000; incorporators, C. J. Goldman, W. A. Bishop.

New Haven, Conn.—New England Car Co., capital stock, \$100,000; incorporators, T. M. Steele, H. T. Sheldon, A. D. Osborne.

Newark, N. J.—Automobile Leather Mfg. Co., capital stock, \$150,000; to manufacture leather; incorporators, W. A. Smith, F. I. Ennis, T. G. Woodruff.

Newark, N. J.—Swinehart Tire and Rubber Co., capital stock, \$10,000; incorporators, I. D. Stone, C. S. Kingsbury, C. L. Codinez.

New York—Approved Auto Specialties Co., capital stock, \$10,000; incorporators, J. B. Brandreth, K. D. Brandreth, E. C. Phelps.

New York—Associated Auto Mechanics, capital stock, \$100,000; incorporators, H. Banres, C. Tichenor, W. J. Hoover.

New York—Latham Phelps Co., capital stock, \$50,000; incorporators, C. H. Latham, N. B. Latham, H. E. Phelps.

New York—New York and New Jersey Seaton Wheel Co., capital stock, \$350,000; to manufacture spring wheels; incorporators, J. T. Landis, W. C. Mack, W. T. Rainey.

Rochester, N. Y.—Central Motor Supply Co., capital stock, \$30,000; to deal in electrical and mechanical devices; incorporators, P. B. Barager, R. F. Close, W. Wood, C. W. Galliger.

Savannah, Ga.—Griffith Auto Co., capital stock, \$10,000; incorporators, C. M. Griffith, J. H. Brown.

Saginaw, Mich.—Wilcox-McKim Co., capital stock, \$125,000; to manufacture steering gears and accessories.

St. Louis, Mo.—John Berry Automobile Co., capital stock, \$20,000; to manufacture and repair motor cars; incorporators, J. Berry, A. Sommer, L. J. Koenigstein.

Steubenville, O.—Ohio Valley Rubber Co., capital stock, \$50,000; to manufacture and deal in rubber and motor car supplies and accessories; incorporators, C. L. Williams, H. L. Wickersham, R. D. Lloyd, E. L. Parker, J. C. Smythe.

Titusville, Pa.—Keystone Automobile and Garage, capital stock, \$20,000; incorporators, A. E. Lambert, W. T. Funk, J. Hall.

Trenton, N. J.—Brooks Garage, capital stock, \$100,000; general motor car business; incorporators, J. L. Brock, H. K. Brock, H. P. Brock.

Trenton, N. J.—Brock's Garage, capital stock, \$100,000; incorporators, J. L. Brock, H. K. Brock, H. P. Brock.

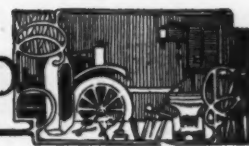
Troy, O.—Hobart Mfg. Co., capital stock, \$1,600,000; to manufacture motor driven machinery; incorporators, H. L. Johnston, W. E. Boyer, E. E. Edgar, W. W. Cope, J. M. Spencer, J. S. Combs.

Warwick, R. I.—Pearl Motor and Marine Supply Co., capital stock, \$50,000; incorporators, G. E. Gibbs, S. C. Burlingame, A. J. Richardson.

Zanesville, O.—Weller Thomas Co., capital stock, \$1,000,000; to manufacture engines and motor car fire trucks.



The Motor Car Repair Shop



IN the preliminary steps given in this department last week, the crankshaft was in an upright position on the work bench and the connecting rod bearings were given their first fitting. It is best to work with one rod at a time. One should be fitted perfectly before the next is started. The crankshaft has been rubbed with a little lamp black and the rod worked in. The rod is removed then and the bearing examined. Little black spots will be seen on the surface of the bearing after the bearing has been rubbed with a clean cloth. If no black spots appear it is evidence that the bearing is not touching the crankshaft at any point.

If the rod was found not to fit snugly when the initial fitting was given, then the shims should first be filed. The shims are those pieces of metal that rest between the two halves of the connecting rod bearing. A filing block should be made. A block of wood is used for this. The block should be gouged on its surface so that the resulting shape resembles the shim. That is, cut two holes out of the wooden block into which the shims will fit. They need not fit perfectly. But these indentations should not be too deep, for a little of the shims must protrude above the top of the block.

Filing the Shims

It is essential that both cuts in the block be of the same depth. The shims are placed then into these grooves and they are ready for filing. Both shims should be filed at the same time. A fine mill file should be run over the surface of the shims by holding the file at M and N, as shown in C. Fig. 1. Do not file much. The object of filing the shims is to bring the bearing halves closer together. The bearing was not touching the shaft, so by bringing the halves of the bearing together a little the bearing is made to touch. It will be seen here that accurate shim filing is essential. The shims should be perfectly level.

With the shims filed, place them in position and give the bearing another fitting. But the shim filing was done because the rod was loose on the shaft. The rod should fit tightly, that is, some effort should be required to push it around.

Taking for granted that the rod has been given a fitting and that it has been examined and found to contain a number of little black spots as shown at D the scraping will be begun. For this operation a device called a bearing scraper, A, is used. This may be procured at any supply store. The scraper is held as shown at D. However, one may be accustomed to scraping and can handle the scraper better in another position. One very important point must be borne in mind and that is

Bearing Scraping

Part II

Operation of Scraping

that the word scraping does not mean, as it usually does—scratching. Scratching is detrimental to the bearing. By scraping is meant cutting from the surface of the bearing a very thin shaving of metal and at the same time leaving the surface of the bearing smooth.

Actual Scraping

The real object of scraping is to get the bearing to touch the crankshaft at every point. That is a hard condition to get, so we get it to touch as nearly as possible at every point. A bearing may be said to be a good one if every $\frac{1}{32}$ inch on the surface of the bearing touches the crankshaft. It will be supposed in this article that the bearing needs scraping. It does not show little black spots every $\frac{1}{32}$ inch. Instead there are a group of spots at one end and another group at the other. This condition is shown at G and E in Fig. 1. This means that the center portion F is not touching the shaft at all. The object now is to make the center portion touch and at the same time make G and E touch.

The little black spots are scraped off one at a time, or nearly so. Short, clean strokes should be made with the scraper and care taken not to roughen the surface of the bearing. The scraper should be moved sideways and at the same time a little forward. It will be found that but one hand is necessary to manipulate the scraper, but that the other is needed to guide the tool.

After all the black spots have been removed the bearing is thoroughly cleaned

with a cloth. The crankshaft is again blackened with lampblack and the rod given another fitting. If at this fitting the rod is loose due to the bearing having been scraped too much, the shims should be filed a little. After the rod has been turned on the crankshaft for about 5 minutes, it should be removed and the bearing again examined.

Little black spots will again be seen, but this time more, if the bearing was scraped properly before. If the entire surface of the bearing contains black spots about $\frac{1}{32}$ inch apart then the bearing is in good condition. But this holds true only if the rod fits snugly on the shaft. If the black spots are again grouped as shown in D, in E and G, then the individual spot scraping is repeated. In D the bearing is shown as being low at F and high at G and E. The object is to get G and E as low as F. This is done by scraping the spots. The operation of scraping the spots is repeated until the rod gives a snug fit and at the same time has the bearing touching uniformly. If it bears at every point but is loose on the shaft, then the shims are filed and the scraping operation begun over.

Valve Adjustment

Very often the complaint is made that no adjustment whatever can be made to quiet the valves of a motor. That if the valves are quiet the motor does not run properly. It happens sometimes that the adjustment is made when the motor is cold and no allowance made for the expansion of the metals. Thus, if there is to be .005 inch clearance between valve and push rod, if the adjustment is made when the motor is cold, this should be possibly .007 inch.

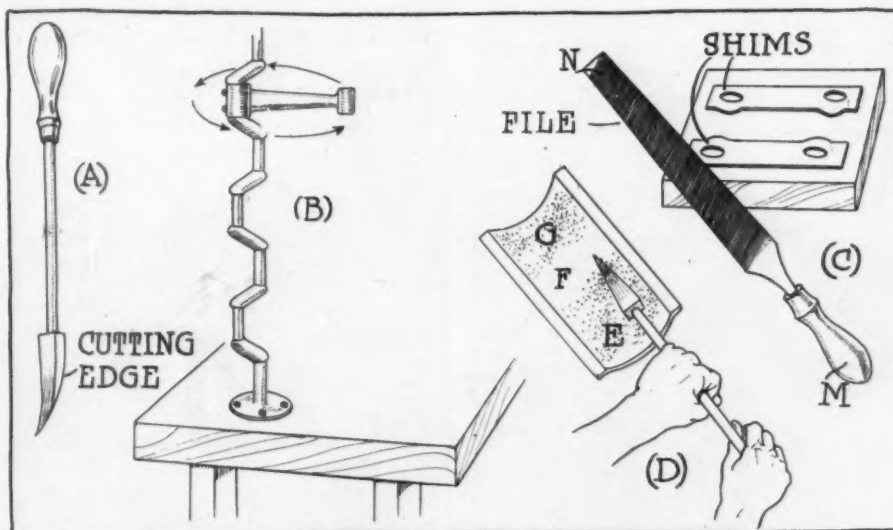
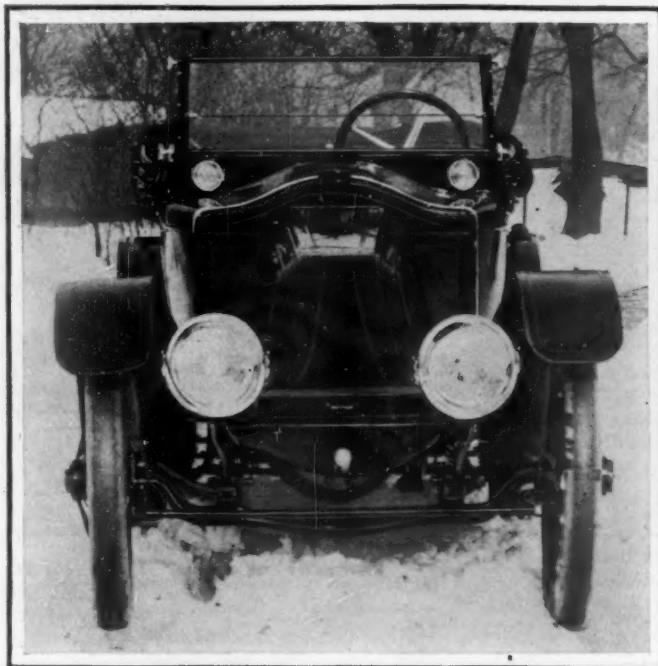


Fig. 1—Steps in bearing scraping. At D is shown method of holding the scraper. Filing the shims diagonally is shown at C. One type of scraper at A. The arrows at B represent the direction in which connecting rod is turned on the shaft when working in the bearing

New Keeton Six of European Type



FRONT VIEW OF NEW KEETON SIX SHOWING DASH INSERT LAMPS.



REAR VIEW SHOWING METHOD OF CARRYING EXTRA WIRE WHEEL

WITH the introduction of the 1913 Keeton six comes the passing of the four-cylinder model. Although the six-cylinder appeared some time ago, the recent product has a number of detail refinements. The Keeton, which is manufactured by the Keeton Motor Co., Detroit, Mich., is of French design, which feature is brought out principally by the Renault-type hood.

The new six has a block motor of the L-head type. The bore is 3.75 inches and the stroke 5.50. This is .25-inch greater than the stroke last year. A four-bearing crankshaft is employed. A feature of the new motor is the spiral timing gears, which makes for quiet running. A constant level splash lubricating system is used. Any deficiency is supplanted by the action of a gear pump. Cooling is by thermo-

syphon system, with the radiator in position on the dash, a characteristic French construction.

In pursuance of foreign practice, the Keeton six employs high-tension fixed ignition. The Mea magneto used is mounted on the crankcase in a transverse position. A Zenith carburetor with warm-air intake is placed on the left side of the motor. The fuel feed to the motor is by pressure, a pump being provided in the center of the forward compartment for getting initial pressure.

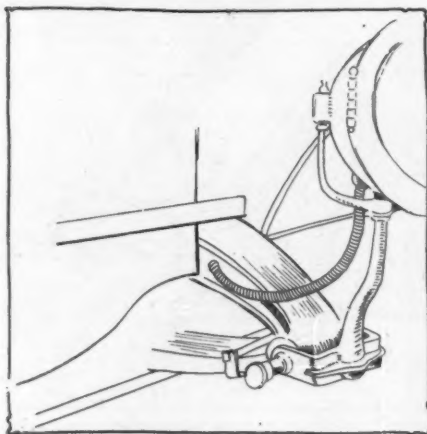
A multiple-disk clutch running in oil operates a four-speed selective gearset. A rear axle of the floating type is housed in a pressed-steel case. The wheelbase of the new Keeton six is 136 inches. The tires are the same size all around, 36 by 4½ inches.

Two control pedals are on the foot board. That on the left operates the clutch and service brake, that on the right the emergency brake.

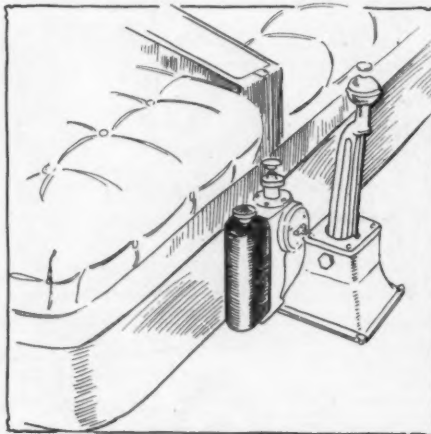
On the theory that the wire wheel is more efficient than the conventional wooden type, the Keeton six is equipped with demountable McCue wire wheels.

The car is started and lighted electrically by the Jesco system. Much trouble has been experienced heretofore in filling the gasoline tank when an extra wheel was carried in the rear. To fill the tank, it was necessary to remove the wheel. This cumbersome arrangement has been overcome in the new model by placing the filler goose-neck between the gasoline tank and the frame, as shown by an illustration.

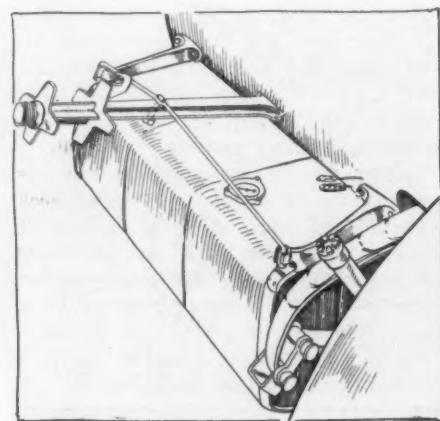
Two, five and seven-passenger bodies are fitted to the chassis.



ODD SUSPENSION OF HEADLIGHT ON KEETON CAR



CONTROL LEVER AND LIGHTING AND STARTING SWITCH



FILLER CAP BETWEEN TANK AND FENDER.

Among the Accessory Manufacturers

IN Fig. 1 is shown the Hilliard dry friction clutch. The feature of this clutch is that it requires a light spring pressure to gain great pressure on the friction plates. It is claimed by the maker, the Hilliard Clutch & Machinery Co., Elmira, N. Y., that the pressure is exerted directly in the center of the plates instead of at one side, as often is the case.

A, Fig. 1, denotes the friction pack. It consists of six plates, three of which are steel and the others steelfaced with non-burn material. The faced plates operate with the flywheel drum, while the plain steel plates operate on the clutch hub. The cam-gear mechanism, as it is called, is shown at B. The adjusting plate and cover also may be seen at B. The spring pressure is compounded by the hub C, thus permitting of a light spring. The clutch weighs 100 pounds and is $4\frac{1}{4}$ inches wide and $9\frac{3}{8}$ inches long. Little care is required after the clutch is installed in the car.

Hale Curb Box

The value of garage floor space has been considered by the Hale-Christy Co., Cleveland, O., which is marketing the curb box shown in Fig. 2. This apparatus permits of tires being inflated while the car is on the street. The box is cylindrical and made of any material desired. It rests under the sidewalk to a depth of 7 feet, and contains 18 feet of hose. A lid is provided, which when opened automatically opens the air valve and puts air under pressure into the hose. A special type of valve is used at the end of the hose.

This valve retains pressure in the air line until the hose is attached to the tire valve. As soon as this is done the air in the hose is automatically released. An indicating gauge may be had for showing pressure in the tire. An added feature of the apparatus is an adjusting valve, which permits the operator to set the valve for any pressure he may desire,

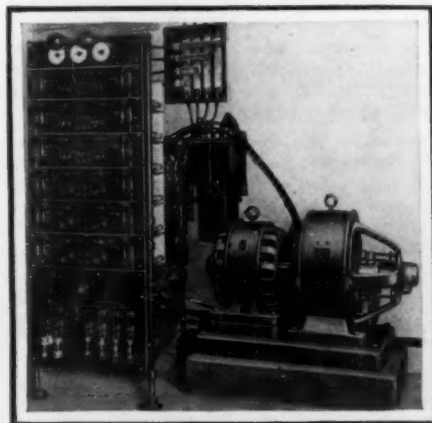


FIG. 3—WESTINGHOUSE BATTERY CHARGING APPARATUS

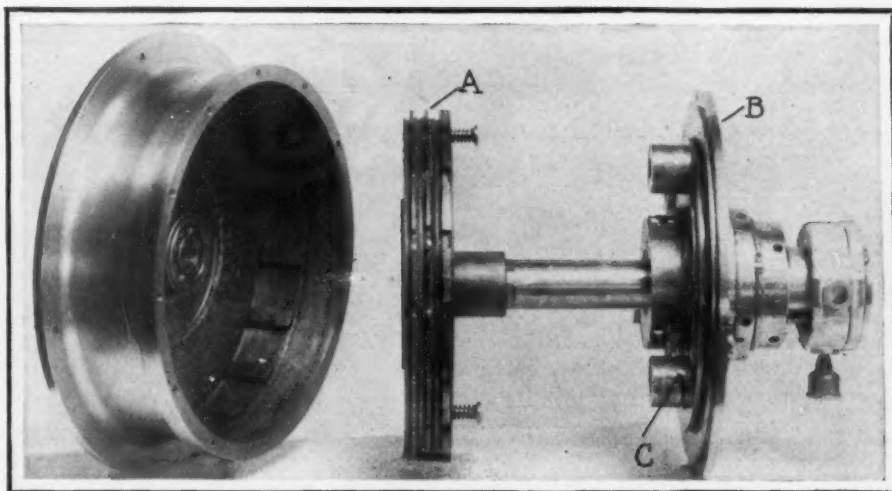


FIG. 1—HILLIARD CLUTCH PARTIALLY DISASSEMBLED

provided that pressure is below that in the storage tank.

Westinghouse Charging Apparatus

Garage owners will be interested in the new battery charging apparatus being offered by the Westinghouse Electric &

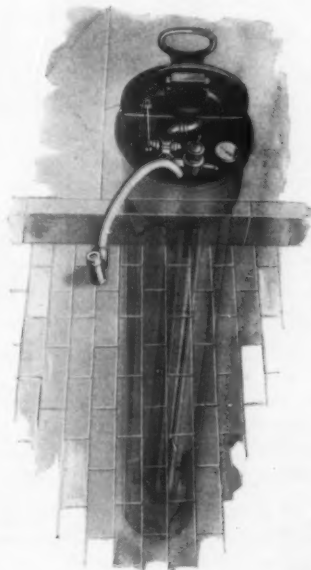


FIG. 2—HALE CURB BOX USED FOR INFLATING TIRES

Mfg. Co., Pittsburgh, Pa. The device, which is shown in Fig. 3, makes use of a motor generator set by which means any desired voltage may be had.

The board shown in the illustration contains six sections, each one of these being a rheostat or resistance unit. On top of these units are the meters by which the current and voltage is read.

Usually, the charging rheostat is a separate unit located near the vehicle being charged and the current is measured by the meters of the vehicle. Sometimes, however, the operator cannot see the meters when operating the rheostat with the

result that poor charging is obtained. The maker claims that the vibration of the car injures the meters so as to make them inaccurate. These difficulties are said to be overcome in the Westinghouse apparatus. In Fig. 3 is shown the apparatus which is capable of charging twelve vehicles at the same time.

Kerfoot Hydraulic Transmission

The oil-operated transmission shown in Fig. 4 was designed by E. L. Kerfoot, Hutchinson, Kan. It consists of two rotary pistons placed end to end with telescoped shaft. The pistons operate in eccentric cylinders and there is a dividing wall between them. Upon the pistons are two or more reciprocating blades. The oil which is contained in the cylinders is controlled by ports and sliding valves. When the ports are closed the oil does not circulate, causing the device to rotate. With the valves entirely open the oil is allowed to flow, which condition causes the apparatus to stop rotating. This corresponds to neutral position of a gearset. By opening the ports a little the oil is partially compressed and the device rotates, but slowly. No clutch is required when the Kerfoot transmission is used.

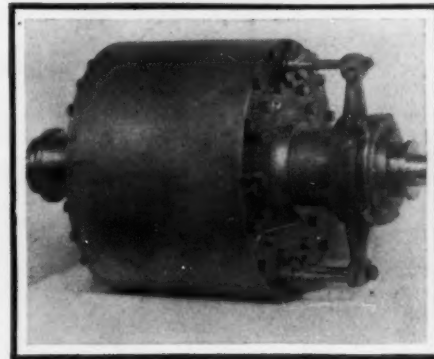
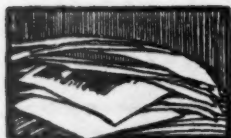


FIG. 4—KERFOOT HYDRAULIC TRANSMISSION



Brief Business Announcements



Recent Agencies Appointed by Motor Car Manufacturers

PLEASURE CARS		
Town	Agent	Car
Aberdeen, S. D.	Aberdeen Auto and Supply Co.	Kisselkar
Akron, O.	Jones Auto Co.	Hudson
Austin, Tex.	W. G. Bell Motor Co.	Oakland
Buffalo, N. Y.	Monroe Motor Car Co.	Marion
Bemidji, Minn.	Charles Knopke	Oakland
Brimfield, Ill.	C. E. Kelley	Haynes
Boonville, Ind.	Edward Bracher and Bros.	Oakland
Concordia, Kan.	Larson and Brightop	Oakland
Cleves, O.	Walker and Hopping	Oakland
Canton, O.	Arnett Auto Co.	Studebaker
Decatur, Ill.	H. Goldfinger	Midland
Des Plaines, Ill.	T. H. Wolf	Midland
El Paso, Tex.	Rio Grande Auto Co.	Kisselkar
Englewood, N. J.	Stillman and Hoag	Haynes
Fergus Falls, Minn.	H. E. Webber	Kisselkar
Faribault, Minn.	Central Auto Co.	Kisselkar
Grand Forks, N. D.	V and V Auto Co.	Oakland
Holt, Mo.	L. H. Riley	Oakland
Joliet, Ill.	Joliet Motor Car Co.	Midland
Kankakee, Ill.	D. L. Hogan	Haynes
Lancaster, Pa.	Samuel K. Landis	R. C. H.
Logan, O.	H. F. Sims	Studebaker
Milledgeville, Ill.	E. C. Miller	Midland
Missoula, Mont.	F. P. Smith	Kisselkar
Miles City, Mont.	Holmes Garage	Kisselkar
Milwaukee, Wis.	Oscar Stegeman	Howard Six
Minonk, Ill.	Minonk Central Garage	Haynes
New Braunfels, Tex.	Gerlich Auto Co.	Oakland
Ottawa, Ill.	H. J. Hilliard	Haynes
Odel, Ill.	Fred A. Zweifel	Midland
Poplar Bluff, Mo.	J. J. Van Eaton	Oakland
Portland, Ore.	A. E. Hale	Jackson
Philadelphia, Pa.	Motor Sales Co.	Henderson
Pontiac, Ill.	C. F. Cook	Haynes
Princeton, W. Va.	Princeton Motor Car Garage Co.	Haynes
Redwood Falls, Minn.	C. D. Thompson	Oakland
Syracuse, N. Y.	W. R. Mason	Peerless
St. Louis, Mo.	Paine Auto Co.	Haynes
Syracuse, N. Y.	Cowand and Pieper	Haynes
Sewickley, Pa.	Auto Service Co.	Oakland
Baltimore, Md.	Coles Sales Co.	Gramm
Baltimore, Md.	R. H. Croxton Motor Co.	Reo
Brooklyn, Mass.	South Brooklyn Auto and Livery Sales Co.	Brown
Chicago	Foraker Motor Truck Co.	Sternberg
Elizabeth, N. J.	F. B. Price	Brown
Joliet, Ill.	J. F. Wilcox and Co.	Brown
Madison, Wis.	Ritter Automobile Co.	Brown
Milwaukee, Wis.	R. D. Rockstead	Commerce
Newark, N. J.	Eagles Motor Co.	Brown
New York	Norwalk Motor Car Co.	Brown
New York	Brown Car Corp.	Brown
Philadelphia, Pa.	Bartlett Garage	Brown

TRUCKS

NEW YORK—The American-Marion Sales Co., has appointed Lee N. Dustin retail sales manager.

Wabash, Ind.—The Service Motor Car Co. has increased its capital stock from \$125,000 to \$250,000.

San Bernardino, Cal.—Fred T. Hendee has organized the Perkins-Hendee Garage Co. His associate is Clement D. Perkins.

Detroit, Mich.—W. C. Knight, former manager of the Indianapolis branch of the Warner Instrument Co., is now connected with the Stewart-Warner branch here.

Washington, D. C.—The Cutting Motor Sales Co., with Robert Love as manager, has opened a sales room at 1532 Fourteenth street N. W. and will handle the Cutting car.

Indianapolis, Ind.—Chester S. Ricker, formerly chief engineer of the Henderson Motor Car Co., has opened an office at 1201 State Life building and will do consulting engineering work.

Springfield, Mass.—The Buick garage, of Hartford, Conn., has opened a branch, which will be known as the Springfield-Buick Co. The new branch is incorporated under the Massachusetts laws, with a capital of \$15,000. David Roberts, of Hartford, and Dr. T. F. O'Laughlin, of Rockville, who

own the Hartford Buick agency, control the new enterprise.

Lima, O.—E. A. Bleck has opened a garage at 125 South Elizabeth street, and has taken the agency for the Oakland.

Kenton, O.—The Kenton Drop Forge and Mfg. Co. has filed papers increasing its capital stock from \$25,000 to \$150,000.

Minneapolis, Minn.—Ora C. Cox has formed the Luverne Auto Sales Co. to handle the Brown-Luverne car. The agency is at 1210 Hennepin avenue.

Waukesha, Wis.—The R. L. Kenyon Co., manufacturing tops, curtains, cushions, portable garages, etc., has commenced work on factory additions, to cost \$15,000.

Washington, D. C.—The Waverley Sales Co. has been formed by Samuel Ash and Ed. Mangold, who have opened a sales room and garage at 1337 Fourteenth street N. W. It will handle the Waverley electric and may add a gasoline car later.

Milwaukee, Wis.—Frank Mulkern, owner of the principal taxicab line here, has organized the Mulkern Garage Co., with M. L. Annenberg as principal partner, to take over and operate the big public garage erected at Hackett, Downer and Bellevue avenues by Julius Strauss in connection with a magnificent series of apartments, at a cost of

more than \$250,000. The two-story garage has a storage capacity of 100 gasoline and 150 electric cars.

Cleveland, O.—The Chandler Motor Car Co. has filed papers increasing its capital stock from \$1,000 to \$425,000.

Milwaukee, Wis.—Oscar Stegeman, president of the Stegeman Motor Car Co., has been appointed agent for the Howard six.

Clintonville, Wis.—W. B. Stevens has formed the Star Garage Co. on Mill street. Orre Williams will be in charge of the mechanical department.

Syracuse, N. Y.—J. W. Lee has bought the garage and sales room formerly occupied by the United Motor-Syracuse Co., at 502 East Genesee street. Mr. Lee handles the Overland and Garford.

Hartford, Wis.—Leach & Christensen have purchased part of the buildings comprising the former Hartford casket works and will establish a garage and sales room. The company handles the Overland.

Indianapolis, Ind.—The Diamond Specialty Co. has been organized to manufacture metal polishes, cleansing compounds and soaps. Those interested in the company, which has been incorporated with a capital of \$40,000, are John G. Wood, Horace F. Wood, William N. Harding and W. A. Harding, Jr.

The time you overhaul is the time to install— STROMBERG CARBURETORS



If your carburetor did not give you 100% efficiency last year—full economy—plenty of power on hills and in rough spots—quick pickup—in fact, everything you could reasonably

expect of a good carburetor, it will interest you to know that

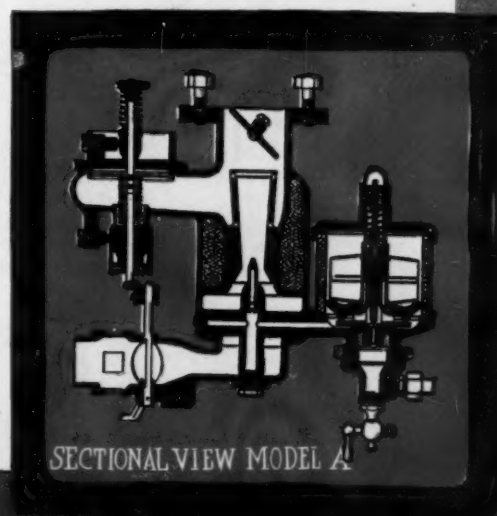
—You can take your car to any STROMBERG Service Station or to any garage in the United States—have your old carburetor removed and a STROMBERG substituted. For 30 days you may put that carburetor to any conceivable fair test. Try it out on the speedway—in muddy, sandy “going”—over hills—in the tropics or at the poles. Keep “tab” on your fuel bills. If at the end of 30 days the carburetor hasn’t *sold itself*, bring it back and its full purchase price will be returned to you. *We won’t be satisfied unless you are.*

Start the motoring season *right*. This spring, when you have your car overhauled, take advantage of the STROMBERG 30-day Free Trial Offer.

Write for our “Reason Why” Booklet.

Stromberg Motor Devices Co.
64-68 East 25th St., Chicago, Ill.

BRANCHES:
NEW YORK MINNEAPOLIS DETROIT
INDIANAPOLIS BOSTON
Canadian Distributors: Russell Motor Car Co.,
Toronto.
Pacific Coast Distributors: Chanslor & Lyon Co.,
San Francisco.



SCHIEBLER

*The Aristocrat
of Carburetors*



"The Heart of the Automobile"

WHEELER & SCHIEBLER

"Pioneers in Perfection" of Carburetion

MANUFACTURERS
INDIANAPOLIS U.S.A.

THE SCHIEBLER IS THE ACKNOWLEDGED STANDARD CARBURETOR OF THE WORLD

Branches

NEW YORK
BOSTON
PHILADELPHIA
ATLANTA
MINNEAPOLIS
KANSAS CITY
CHICAGO

DETROIT
DENVER
SAN FRANCISCO
LOS ANGELES
SEATTLE
MONTREAL CAN.
SIDNEY AUSTRALIA

Service Department

Distributors

Every city and town in
the United States and
Canada • Europe and
• Australia •

"My Experience

in dealing with automobile accident cases has led me to the belief that the bulb-horn is an appliance the use of which should be eliminated by statute or ordinance. I cannot understand why its use is permitted, as from every point of view it is worthless.

"As a means of warning it is valueless. There is nothing about its sound which attracts attention from the public. Accidents occur more frequently with automobiles equipped with bulb-horns than with horns of later invention. It is as antiquated as the oil lamp."

Frank E. Morn

Claim Agent, Metropolitan Claim Department,
The Ocean and Guarantee Co., Ltd.,
59 John Street, New York

—And as a
result the
Ocean Accident &
Guarantee Com-
pany attaches this
rider to each of its
automobile acci-
dent policies.

The ATTENTION

of the assured is called to the value of an efficient warning device in the prevention of accident.

The horn operated by means of a rubber bulb is frequently inaudible and cannot be relied upon in an emergency. It is a matter of record and experience that the bulb horn is inadequate to the demands of safe motoring.

An adequate danger signal should produce a harsh, abrupt note sufficiently loud to be heard under all conditions of traffic.

Ocean Accident & Guarantee Co., Ltd.

48 DIFFERENT MAKES OF CARS ARE NOW KLAXONIZED

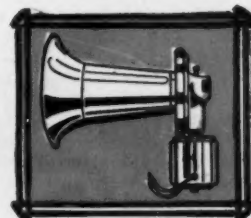


KLAXONET

(Lovell-McConnell Mfg Company - Newark, N.J., U.S.A.)

KLAXON

"The Public Safety Signal"



KLAXON

Stock Champion

National

International Champion



Five-Passenger Touring Car, One of Five Models—\$2,750 to \$3,400. Electric Starter—Electric Lights—Center Control—Left Side Drive

Buy a Whole Car—Not One Feature

You Want *Service*—Not Specifications

NO matter how attractive some single experiment of an ambitious engineer may look—a car with one weak feature is a poor investment. A car is no better than its weakest feature—be it an inferior steering knuckle, a faulty motor or any one weakness.

You want a whole car, one that operates as a unit, and one with every feature, large or small, absolutely reliable and capable of year after year of hard service.

In the National, every part is perfected—there is not one weakness, not one experiment, as all "risks" and "chances" and "uncertainties" are eliminated. No car is better built—none built with greater care and knowledge than the National. We can prove this to you any day.

The National operates as a complete car, and gives you service over all manner of roads, in any kind of weather, year after year, and is always dependable. We do not boast of free repairs—but no repairs. Beware of the high cost of repairs on experiments.

Your Safe Way

DON'T you pay for any factory's experiments and tests. Demand a finished, absolutely proven product for your money.

You are safe if you buy a car of long reputation for leadership, of years and years of proven superiority in all manner of contests, where the National has defeated much higher priced machines.

You are safe if you rely upon what the thousands of National owners all over the earth will tell you.

You are safe if you buy from a factory of unimpeachable reputation and stability.

The superior design and construction of the National guarantees that your car will bring a high price as a used car. Look today anywhere where second-hand cars are advertised for sale and see how few Nationals are ever listed. There is a big demand for used National cars all the time—bigger than the supply. The National does not sacrifice quality in order to cut price and cater to any popular fad.

The National does not rush blindly into experiments in order to create a sensation, or in order to lure sales. The National builds for quality, not quantity. Money can not buy better materials than used in the National.

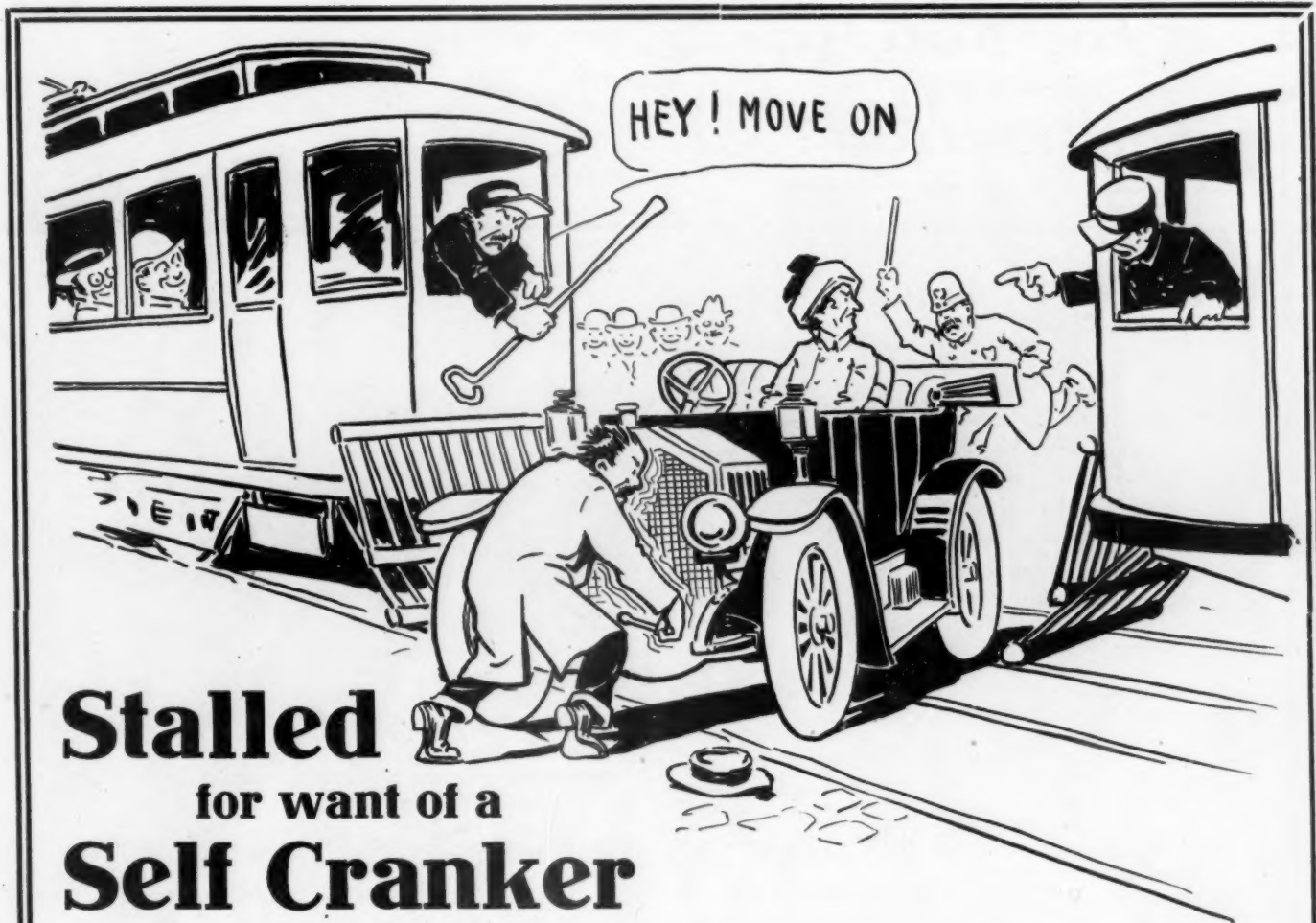
Price Commensurate with Quality

IN design, luxury, comfort, the National knows no superior. The noiseless operation, the ease of control, the powerful brakes, the reliable electric self-starter, the convenience and completeness of equipment of the National not only convinces you of its absolute leadership—but causes you to marvel at its modest cost. Buy not only a car for today—but an asset for the years to come.

The National is never compared, nor associated in thought with any machine except those fabulously priced creations costing \$5,000 or more.

The National is destined to continue to predominate because it is built right—because it is proven superior—and because the builders are conservative and reliable.

National Motor Vehicle Company
Indianapolis, Indiana



Stalled for want of a Self Cranker

Every person who drives a gasoline car has had this unpleasant experience, delaying traffic and running the risk of serious injury.

With an Electric self-cranker your car may be started instantly, by the push of a button, without leaving your seat.

It is positive insurance against accident in a case like this, adds to your convenience and eliminates the necessity of soiling hands and clothes while wrestling with a crank before an amused audience.

Investigate the good Electric System for cranking and lighting. You'll probably find them operated from an **GLBA** Storage Battery. If not, insist that yours must have an



STORAGE BATTERY

Use Class A **GLBA** Battery with an Electric Lighting Generator
Use Class B **GLBA** Battery with an Electric Self-Starter

Write us for full information

Willard Storage Battery Co.
CLEVELAND, OHIO

New York Branch: 136 W. 52d St.
Detroit Branch: 1191 Woodward Ave.

Chicago Branch: 2241 Michigan Ave.
San Francisco Branch: 243 Monadnock Bldg.

Depots in all Principal Cities in the United States, Canada and Mexico

When Writing to Advertisers, Please Mention Motor Age.

For You or For Friction?



Friction steals mileage that belongs to the motorist.

In time its rub—rub—rub wears out every motor.

The time depends on the lubrication.

Every year hundreds of thousands of automobiles go over the road—lubricated—yes—but lubricated badly. Generally these motorists will say that their cars "seem to be working all right."

But unnecessary friction is at work. The efficiency of the motors diminishes rapidly. Noisy operation starts too early. The cars "go bad" long before they should.

This rapid deterioration in motor-efficiency is commonly accepted as a necessary evil.

It is due to only one thing—careless and improper lubrication.

Any oil will lubricate to an extent. So will lard. But a lubricating oil, to be really efficient, must both wear well in use, and retain proper lubricating qualities under the heat of service.

Such oils are rare.

And, given an oil with these qualities (and remember, they are rare), the motorist must next make sure that the oil's "body" suits his type of motor.

Motors differ widely. The oil suited to one motor will often be entirely too light or too heavy

for another. That is bad—quite as bad as poor lubricating quality in the oil itself. It prevents proper feeding to the friction points.

In arriving at the correct oil, the motor's construction must be carefully considered.

In our lubricating chart, which will be mailed on request, will be found the grade of Gargoyle Mobiloil best suited to each motor.

This chart will appear later in many publications of wide circulation.

The recommendations in the chart are based on a careful motor-analysis of each make of American car, and on practical demonstrations.

If oils of any other "body", or of lower lubricating qualities are used, sooner or later the motor must pay the consequences. Unnecessary friction will certainly result.

A word about ourselves.

Lubrication with us is both a business and a profession.

The world-wide recognition of our authority on matters of lubrication has been established by our ability to manufacture the correct oil for a given purpose. Our professional standing is behind the grade of Gargoyle Mobiloil which is recommended for each car in our chart of recommendations.

GARGOYLE Mobiloil A grade for each type of motor

The various grades, refined and filtered to remove free carbon, are:

Gargoyle Mobiloil "A"

Gargoyle Mobiloil "D"

Gargoyle Mobiloil "B"

Gargoyle Mobiloil "E"

Gargoyle Mobiloil "Arctic"

They are put up in 1 and 5 gallon *sealed cans*, in half-barrels and barrels. *All are branded with the Gargoyle, which is our mark of manufacture.* They can be secured from all reliable garages, automobile supply stores, and others who supply lubricants.

VACUUM OIL CO., Rochester, U. S. A.

BRANCHES:

DETROIT
Ford Bldg.

BOSTON
49 Federal St.

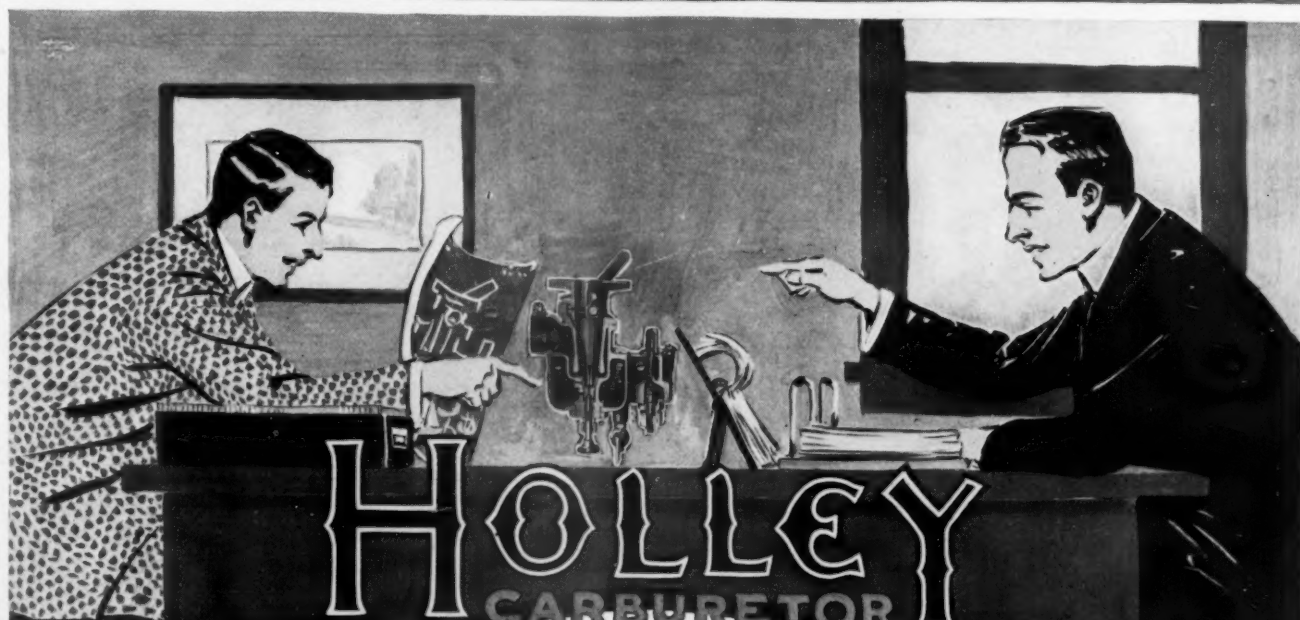
NEW YORK
29 Broadway

CHICAGO
Fisher Bldg.

PHILADELPHIA
4th & Chestnut Sts.

INDIANAPOLIS
Indiana Pythian Bldg.

Distributing warehouses in the principal cities of the world



SIMPLICITY

No Moving Parts. One Adjustment

Therein lies the secret of the great success of this new, accurate, self-adjusting **Holley**.

Over 200,000 of these have been sold for 1913 delivery.

Never before has any carburetor met with such instantaneous acceptance at the hands of acknowledged judges.

Sixteen of the world's largest motor car manufacturers use the **Holley Carburetor**.

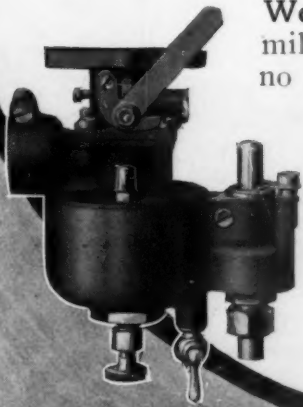
Others are following as fast as their contracts with other manufacturers expire.

The **Holley** six-cylinder carburetor will permit any six-cylinder car to be throttled well below **five miles per hour on high gear**.

We guarantee this carburetor to give an acceleration from a speed of ten miles per hour to **thirty miles per hour in ten seconds** in a car having a gear ratio of not less than $3\frac{1}{2}$ to one.

We guarantee a mileage of no less than **fifteen miles per gallon of gasoline** for a six-cylinder of no more than four inches bore and five inches stroke when used over average roads at ordinary running speeds.

Let us show you what it will do for you.



Holley Brothers Co.
Detroit, Michigan

**NO
MOVING
PARTS**

Dreadnought Moline

PROVEN ECONOMY

BECAUSE OF OUR WONDERFUL LONG STROKE MOTOR: This was the first long stroke motor built in America. Continued refinement and improvement has placed it in the lead of all American built motors in the matter of economical use of gasoline and oil.

AND ALSO ON ACCOUNT OF THE ATTENTION PAID TO DETAIL:--Every small detail of the Dreadnought chassis receives the same care as to refinement and excellence of detail as is only expected in the higher priced cars.

PROOF POSITIVE:--The winning of all economy tests entered. Absolute unquestioned supremacy in all kinds of endurance runs. A greater percentage of old Moline owners re-purchase Dreadnoughts than any other product.

SPECIFICATIONS

Two models, a Five and Two: Forty horse power, long stroke motor, $4\frac{1}{8} \times 6$, unit power plant, 124-inch wheel base in five passenger, 114-inch in two, full elliptic rear springs, electric starting and lighting, mohair top and top hood, Firestone demountable rims, extra rims, tire irons, speedometer, glass front and tools.

DEALERS--If you want to build your business on the basis of satisfied customers, write today for our proposition.

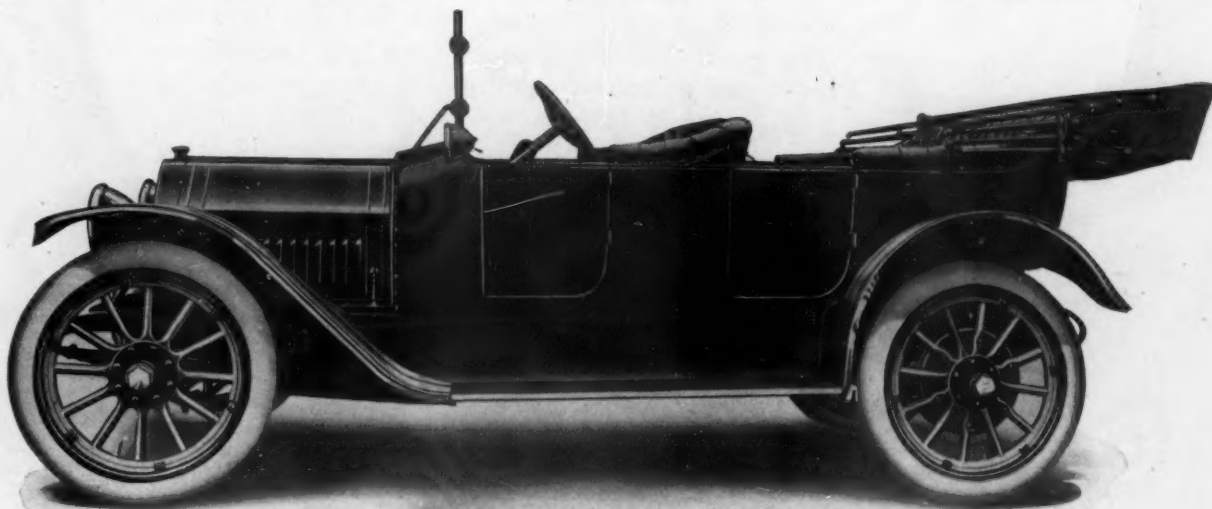
Moline Automobile Company

109 Keokuk Street

East Moline

Illinois

U. S. A.



\$1950

Dreadnought Moline M-40

\$1950

When Writing to Advertisers, Please Mention Motor Age.



GUARANTEED!

Frommann Wheels

- 1—The metal construction of the FROMMANN Wheel of Fortune is **guaranteed** to outlast any car the wheel is put on.
- 2—The resiliency of the FROMMANN Wheel of Fortune is **guaranteed** to be from 2 to 12 times greater than that of the tires you are now using.
- 3—For the first 2 to 3 years (depending on weight of vehicle) the maintenance of the FROMMANN Wheel of Fortune is **guaranteed** not to exceed \$40 per wheel.
- 4—The rubber cushions used in the construction of the FROMMANN Wheel of Fortune are **guaranteed** for 3 years on all pleasure cars and on all trucks under 4 tons in weight.
- 5—These rubber cushions are **guaranteed** for 2 years on all trucks over 4 tons in weight.

Two Wheels In One

The FROMMANN Wheel of Fortune is conceded by 33 mechanical experts to be the first logical solution of the tire problem. The FROMMANN Wheel is unique in principle. It is a "Wheel Within a Wheel." It comprises a floating **outer** wheel for **wear**—and a distinctly separate **inner** wheel for **resiliency**.

Tremendous saving in upkeep is made because your rubber—the source of resilience—is armor-proofed against road wear.

Pay For Themselves In 10 Months

It is a **mechanical impossibility** for FROMMANN Wheels to puncture, blow-out, chip, chafe or oil-rot. If you are interested in a wheel that will pay for itself in 10 months—and pay you dividends on your investment ever afterwards—a wheel that will save you hundreds of dollars in upkeep the first year; write for free booklets, "Turning Upkeep Into Income," and "One Fact For Truck Manufacturers."

The Wheel of Fortune Corporation

Karpen Bldg., 900 So. Michigan Ave.

Chicago, Ill.

OPEN LETTER (NO. 3) FROM



MAXWELL MOTOR COMPANY

INCORPORATED

DETROIT, MICHIGAN

March 22, 1913

SUBJECT: "WHY WE DID NOT USE ALL OUR PLANTS"

Gentlemen:-

You are of course aware that when the group of capitalists who financed the new Maxwell Motor Company, bid in at the Receivers sale, all the plants and other assets of the late United States Motor Company, they secured a number of factories for the making of automobiles and automobile parts, that are among the best in the industry.

To refresh your memory: There were the following plants:

Providence Engineering Works,	Providence, R.I.
Maxwell-Briscoe Company,	Auburn, R.I.
Maxwell-Briscoe Company,	Tarrytown, N.Y.
Briscoe Manufacturing Company,	Newark, N.J.
Alden-Sampson Company,	Detroit, Mich.
Brush Runabout Company,	Detroit, Mich.
Stoddard-Dayton Company, (Two factories)	Dayton, Ohio.
Briscoe Manufacturing Company,	Detroit, Mich.
Courier Motor Company,	Dayton, Ohio.
Columbia Motor Company,	Hartford, Conn.

Also the plant of the Flanders Motor Company at Detroit.

Combined acreage,	241.5
Combined floor-space,	2,684,648 sq.ft.

Now it will perhaps be news to you that we do not propose using all these plants--and the reasons will be interesting to you as showing how quality is put into a car and at the same time price is brought down to within the reach of thousands.

Take for example, the plant at Providence, R.I. This would be considered a splendid plant by some automobile concerns. It is rich in history, in tradition and in past achievements. Here George Gorliss learned his trade. Others equally famous worked in this plant in its halcyon days. But it won't answer our needs today. We have sold it. Admirable for other lines, but not for this.

The Tarrytown plant we will also offer for sale, because the land value is too high for automobile manufacturing purposes, and it would be necessary to purchase many additional acres and erect

MR. FLANDERS TO DEALERS

2.

buildings to take care of the quantity of cars we intend to produce. Besides, the 5,000 men necessary to man such plants, would have difficulty in securing living quarters in Tarrytown.

The Auburn, R.I. plant, consisting of 250,000 sq.ft. of floor-space, excellent three story brick mill construction, we offer for sale because, tho an excellent labor centre, there are good manufacturing reasons why it is not an economical place to produce automobiles.

Also, for similar reasons, and because they are located at too great distances from the other plants and from our centre of operations, we will dispose of the Briscoe plant at Newark and the Courier plant at Dayton.

Do you know, that the percentage of profit on automobiles is less than almost any other line--farm implements, furniture, pianos, sewing machines, etc. Much less. And competition is keener. We have no trusts, no monopolies, in this business, yet--nor are we likely to have.

The only chance we see for success is in producing cars in quantities, contenting ourselves with a small profit per car so as to get the selling price down to within the reach of thousands who must absorb this product.

And this can be done only in plants where the highest efficiency can be obtained--almost ideal working conditions. In other words, light, ventilation, sanitation.

Then the latest types of automatic and labor-saving tools must be installed. The equipment must be faultless.

Our plants in Detroit, in Dayton and in Newcastle, are of the latest type concrete and brick construction; "saw-tooth roof" type; mostly "ground floor", and admirably adapted for economical manufacturing. These we have re-arranged, re-equipped and laid out for the building of every part of every model in quantities.

Each plant will be devoted exclusively to the making of one model--"In the Flanders plants", we make the "50-6"; in the Dayton plants, the "35-4", and in the combined Brush and Sampson plants, which are on the same tract of ground--45 acres--every last part of the "25-4" will be made.

I claim you can't make two chassis models in the same plant and keep both up to concert pitch--make it the leader in its class, and nothing short of that will satisfy us.

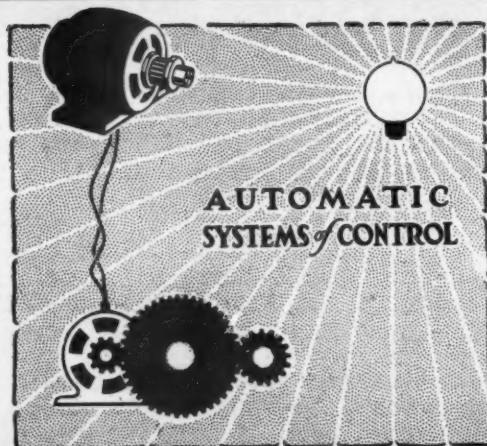
Yours very truly,

MAXWELL MOTOR COMPANY (Inc)

Walter E. Flanders.

President and General Manager

WARD LEONARD



Lighting - Starting

The WARD LEONARD SYSTEM

Simple, Foolproof, Scientifically Perfect

The greater the inventor, the simpler the product. A man's ability to explain a principle and make it applicable to human want, depends entirely upon his own mastery of that principle.

This is the reason why the WARD LEONARD electric lighting and starting system is the simplest and the most scientifically perfect system on the automobile market.

The WARD LEONARD SYSTEM is the product and invention of an electrical expert, but an expert is not needed to understand it. The perfection of automatic control in WARD

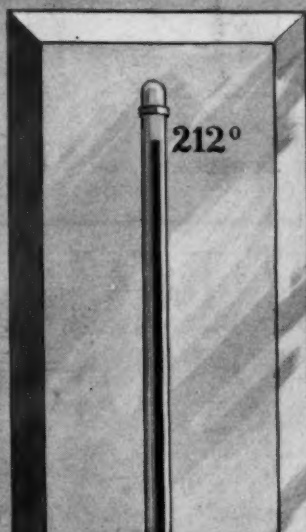
LEONARD SYSTEMS is one of the greatest triumphs in automobile history.

No matter what the speed of the motor may be, the storage battery is always kept evenly and fully charged. And the storage battery is the very soul of the electric lighting and starting system.

A shunt dynamo for lighting, a series motor for starting—these are the fundamental features of the WARD LEONARD SYSTEM, and the electrical industry has endorsed them.

The WARD LEONARD SYSTEM is not an "almost good," but a scientific and commercial success.

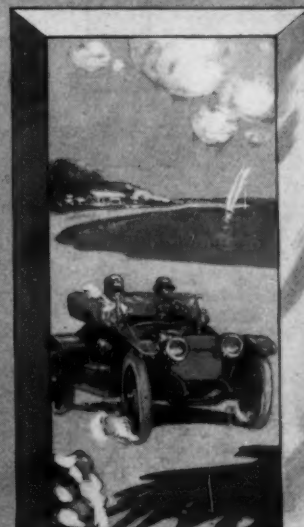
WARD LEONARD ELECTRIC COMPANY, Bronxville, New York



For All Motors

Taking down motors and putting them up again is one of the costliest items of upkeep. And the best motors, when improperly lubricated, need this attention too often.

Polarine obviates this necessity by perfectly lubricating all parts.



Polarine

FRICION REDUCING MOTOR OIL



It flows freely, even at zero. It maintains the correct lubricating body at any motor speed or heat.

Polarine is used in hundreds of thousands of motors of every type—in every climate and temperature. It is sold everywhere so tourists can get it no matter where they happen to be.

For motor cars, motor trucks, and motor boats—the finest oil that's made today by the *World's Oil Specialists* after 50 years' experience with every kind of friction problem.

Insure a low upkeep cost—insure your car's maximum re-sale value—insure uninterrupted motoring pleasure by using Polarine.



Standard Oil Company

(AN INDIANA CORPORATION)

Makers of Special Lubricating Oils for Leading Engineering and Industrial Works of the World

TIMKEN

BEARINGS & AXLES



??? ??? Miles

THROUGH how many miles of road service will the bearings in your car stand up—and give full efficiency?

How long will they carry the weight of car and load, meet the hammer blows from jolts over rough city pavements and car tracks, from deep-rutted country roads?

How long will they keep shafts in alignment, keep gears in correct mesh, hold friction down to near nothing—save power?

These questions strike the root of the economy, the satisfaction and the safety of year after year operation of your motor-car.

The Timken Tapered Roller Bearing is the one anti-friction bearing whose principles of design enable the effect of wear to be wholly eliminated by adjustment without the least sacrifice of its efficiency.

Because it is adjustable perfectly for wear; because the line contact of its rollers enables it to support greater load and stand greater shocks; because its tapered construction enables it to meet end-pressure as well as vertical load—The Timken Tapered Roller Bearing is found in the wheels of the great majority of American motor-cars, both pleasure and commercial, and in many leading foreign cars as well.

The life-time efficiency of the Timken Roller Bearing is also one of the fundamental reasons for the success and wide adoption of Timken-Detroit Axles.

It will pay you to learn more about these essential parts of the car—bearings and axles. You can do so by sending for the Timken Primers T-7, on Bearings; T-8, on Axles. Sent free postpaid on request to either address below. Write today.

Timken Tapered Roller Bearings on the spindle of a Timken-Detroit Front Axle for Pleasure Car.



THE TIMKEN ROLLER BEARING CO.
Canton, Ohio

THE TIMKEN-DETROIT AXLE CO.
Detroit, Mich.



When Writing to Advertisers, Please Mention Motor Age.

REMY

Electric Company

(With a country-wide system of branches and service stations)

Designers and Builders
of
High Grade
Starting and Lighting
Equipment For Motor Cars
(Sold to car makers only)

Makers of magnetos for fourteen years

Our country-wide service is available to
each user of Remy equipment

Write us to-day about our Magneto exchange offer. We will
make a liberal allowance for old equipment (any make)

REMY

Pioneer Manufacturers of Ignition Equipment

Factory and General Offices:
Anderson, Indiana

The Atwater Kent Ignition System

THE Flexibility and Power obtainable from a motor equipped with the Atwater Kent Ignition System, especially our latest development, Model "K" with automatic spark control, is one of the most important developments in the motor industry.

Think what it means in smooth, sweet running that even the biggest and heaviest four and six-cylinder cars equipped with the Atwater Kent Ignition System may be throttled down on high gear through crowded streets as slowly as three miles per hour and accelerated on good stretches of road to the maximum speed of which the motor is capable without once touching the spark lever.

The automatic spark control of the Type "K" Atwater Kent System is more than human in its performance—it is sensitive to the slightest variation in speed—immediate in its response and positive in its action.

No single detail looking toward durability and simplicity has been neglected in this new type, which contains but three moving parts, virtually non-wearable, one contact and a single adjustment needed but once every 10,000 miles.

Picture the pleasure of automatic spark control on your present or future car and you will find your desires realized in the new Type "K" Atwater Kent Ignition System.

Our booklet explains the Atwater Kent System and the value of automatic spark control. Write for a copy.

ATWATER KENT MFG. WORKS

4934 Stenton Avenue
Philadelphia, Pa.

DISTRIBUTORS—New York, E. J. Edmond Co.; Chicago, Motor Car Supply Co., Pellets Magneto Exchange; San Francisco, Chanslor & Lyon Co., Weinstock-Nichols Co.; Los Angeles, E. A. Featherstone; Seattle, Chanslor & Lyon Co.; Portland, Ballou & Wright; Omaha, Omaha Rubber Co., Powell Auto Supply Co.; Dallas and Houston, Fisk Co. of Texas; Wichita, Hockaday Auto Supply Co.; St. Louis, Missouri Auto Specialty Co.; Salina, Lee Hardware Co.; Kansas City, Kansas City Auto Supply Co.; Milwaukee, Julius Andrae & Sons Co.; Detroit, Automobile Equipment Co.; Boston, Motor Supply Shop; Denver, Auto Equipment Co.; Hartford, Post & Lester Co.; Atlanta, Elyea-Austell Co.; Chattanooga, Southern Auto & Supply Co.





A PROPOSITION FOR LIVE DEALERS

WHAT THE PROPOSITION MEANS TO YOU

If you handle Cook's Auto Lubricant you have a lubricant which you can conscientiously recommend to all your customers, no "ifs or ands" about it, for you can prove it reduces operating expenses and increases the power of autos. It is a product which makes every first buyer a constant buyer.

WHAT COOK'S LUBRICANT WILL DO

Cook's Lubricant is for the lubrication of all gears—transmission, differential, timing and equalizing gears.

Cook's Lubricant possesses all the lubricating qualities of the best gear oil without its big fault—wastefulness.

• Cook's Lubricant will not leak out of the gear case; it cannot be thrown off the gears by centrifugal force; it will not drip from the gears and settle in the bottom of the gear case; it cannot be cut up and packed aside by the gear teeth and is not affected by changes in temperature.

WHAT YOU SHOULD DO

If you have not made arrangements to carry Cook's Lubricant in stock during 1913, *write immediately* for our *NEW DEALERS' PROPOSITION*. Cook's Lubricant is not only easy to sell—but stays sold. What is more, it brings repeat orders. It is the kind of a product a live dealer wants. *Write now for the proposition.*

COOK'S LUB. DEPT.

ALBANY LUBRICATING CO.

ADAM COOK'S SONS, PROPS.

708-710 Washington Street, New York

What an Engine Did

By R. E. Olds, Designer

My fame as a car builder, after 26 years, is based in large part on my engine.

To me it's an old, old story. Perhaps it is new to you.

A Lifetime

I was one of the world's first builders of gas engines. Long before the days of automobiles, the Olds Gas Engines were known half the world over. And they are today.

It has taken a lifetime to develop an engine like the one in Reo the Fifth. And even my rivals concede it to be one of the great engines of the world.

My catalog states all the details about it. I won't bother with them here. But the fame of this engine is based on four things:

Its unusual power—
Its enduring silence—
Its remarkable endurance—
Its ease of adjustment.

Radical Tests

We avoid trouble for you by putting each engine to five radical tests in our factory.

Each is run for 10 hours with outside power, then another 10 hours with its own power. Then we take it apart and inspect it.

Then it is made to run a blower, and tested at various speeds. Then it runs an absorption dynamometer, as a measure of its power. Then, in the finished car, we give it the hardest sort of road test.

These tests require 48 hours. But thousands of these engines, run for years and years, are still in prime condition.

We use on this engine, to save ignition troubles, a \$75 magneto. And we doubly heat our carburetor, to deal with any gasoline.

So Everywhere

In every part of this car we use the same precautions.

The steel is twice analyzed.
The gears are tested to stand

75,000 pounds per tooth. The springs for 100,000 vibrations.

We use 190 drop forgings.

We use 15 roller bearings.

The tires are 34x4.

Each body gets 17 coats.

When you get a car built like Reo the Fifth there is very small cost of upkeep.

Unique Control

We use in this car the only center control which is simple and out of the way.

All the gear shifting is done by moving a small rod only three inches in each of four directions.

There are no levers, side or center, so the front is clear. Both brakes are operated by foot pedals.

And in this car you find the left side drive, as in the finest cars this year.

Write for our catalog and we'll direct you to the nearest showroom.

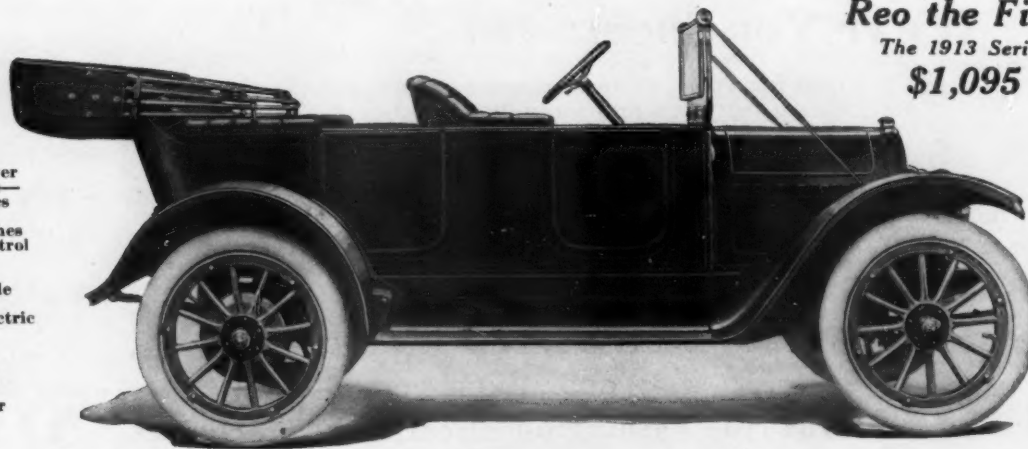
R. M. Owen & Co., General Sales Agents for Reo Motor Car Co., Lansing, Mich.
Canadian Factory, St. Catharines, Ont.

Reo the Fifth

The 1913 Series

\$1,095

30-35
Horsepower
Wheel Base—
112 Inches
Tires—
34x4 Inches
Center Control
15 Roller
Bearings
Demountable
Rims
Three Electric
Lights
190 Drop
Forgings
Made with
5 and 2
Passenger
Bodies



Top and windshield not included in price. We equip this car with mohair top, side curtains and slip cover, windshield, Prest-O-Lite gas tank for headlights, speedometer, self-starter, extra rim and brackets—all for \$100 extra (list price \$170).
(Gray & Davis Electric Lighting and Starting System at an extra price, if wanted.)

JEFFERY-DEWITT CO.
DETROIT, MICH.

SPARK PLUGS

Before **After**

R Diagnosis Ignition Trouble
Prescription . . . One Set J-D Plugs
Fee 75c and Up

Cured Him—Will Cure You



Dealers Are Ignition Specialists

Sooner or later—every man with a balky motor becomes a J-D patron, for J-D plugs are the standard cure for over-oiled and dirty engines. There is—in the J-D line—a type for every kind of motor, for every ignition defect, for every motorist's preference, for every pocketbook.

J-D plugs are as good for bad motors as they are superlative for good motors. As a result—they oversell every other high grade make. J-D dealers are everywhere recognized as ignition experts—as specialists in spark plugs.

J-D dealers reap the rewards of this popularity. The merit of the J-D line puts dollars in their pockets. If you are not already selling J-D plugs, write at once and find out why you ought to.

JEFFERY-DEWITT COMPANY

51 Butler Avenue

Detroit, U. S. A.

\$985

F. O. B. Toledo

Completely Equipped

Self-Starter
 30 Horsepower
 5-Pass. Touring Car
 110 inch Wheel Base
 Timken Bearings
 Center Control

Overland**\$985**

F. O. B. Toledo

Completely Equipped

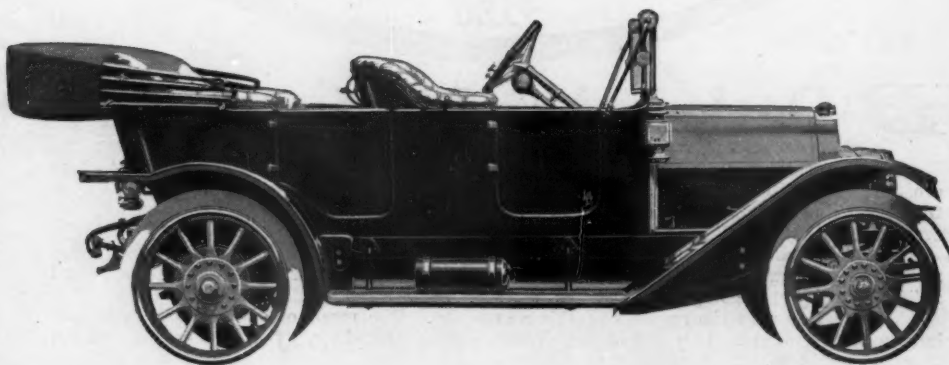
Remy Magneto
 Warner Speedometer
 Mohair Top and Boot
 Clear Vision, Rain Vision
 Wind Shield
 Prest-O-Lite Tank

IN ten years the world's automobile production increased 8,000 per cent. But in six years Overland sales have increased nearly 10,000 per cent. This phenomenal popularity is the greatest proof in the world that in the Overland you get more car for less money than any other manufacturer can give.

For example—study the specifications given above.

Catalog on request. Please address Dept. 46.

The Willys-Overland Co., Toledo, O.





Westinghouse

Electric

Ignition, Lighting and Starting

AUTOMOBILE owners have no desire to have experiments tried on their cars.

They want a starter that starts—always. Lighting and Ignition must also be absolutely dependable.

Manufacturers are expected to give buyers a car proven in every particular.

Four years were given to the perfecting of the **Westinghouse System of Ignition, Lighting and Starting**, before it was offered to the automobile trade.

The buyer can be sure that, when a car is

equipped with the **Westinghouse System of Ignition, Lighting and Starting**, there is nothing to worry about. It's automatic, and starts and lights at the press of a button.

The following statement has great weight with automobile buyers. "The Westinghouse Company backs its System of Ignition, Lighting and Starting with all its resources. It is in unequalled position to furnish service to manufacturers, agents and dealers who use its equipment, through its forty-five offices located in every large city in the country."



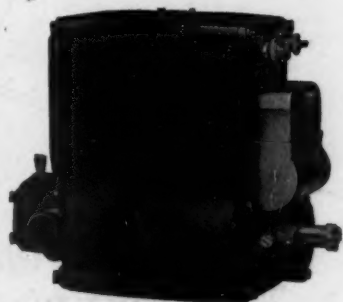
Equip your cars with the Westinghouse System



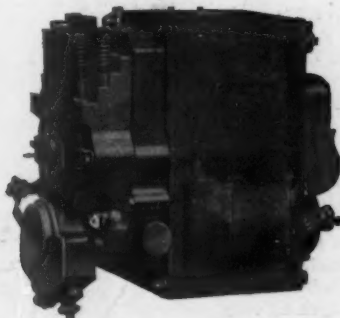
Westinghouse Electric and Manufacturing Company

Sales Offices in 45 American Cities

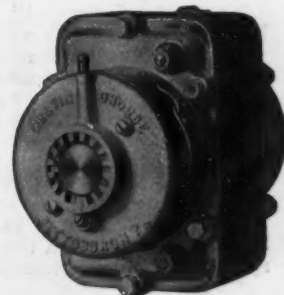
EAST PITTSBURGH, PA.



Lighting Generator



Combined Ignition and Lighting Generator



Starting Motor

When Writing to Advertisers, Please Mention Motor Age.

1200S starts



From a Standstill

And the Battery Full at the Finish

APLCO

The System That Takes Care of the Battery.

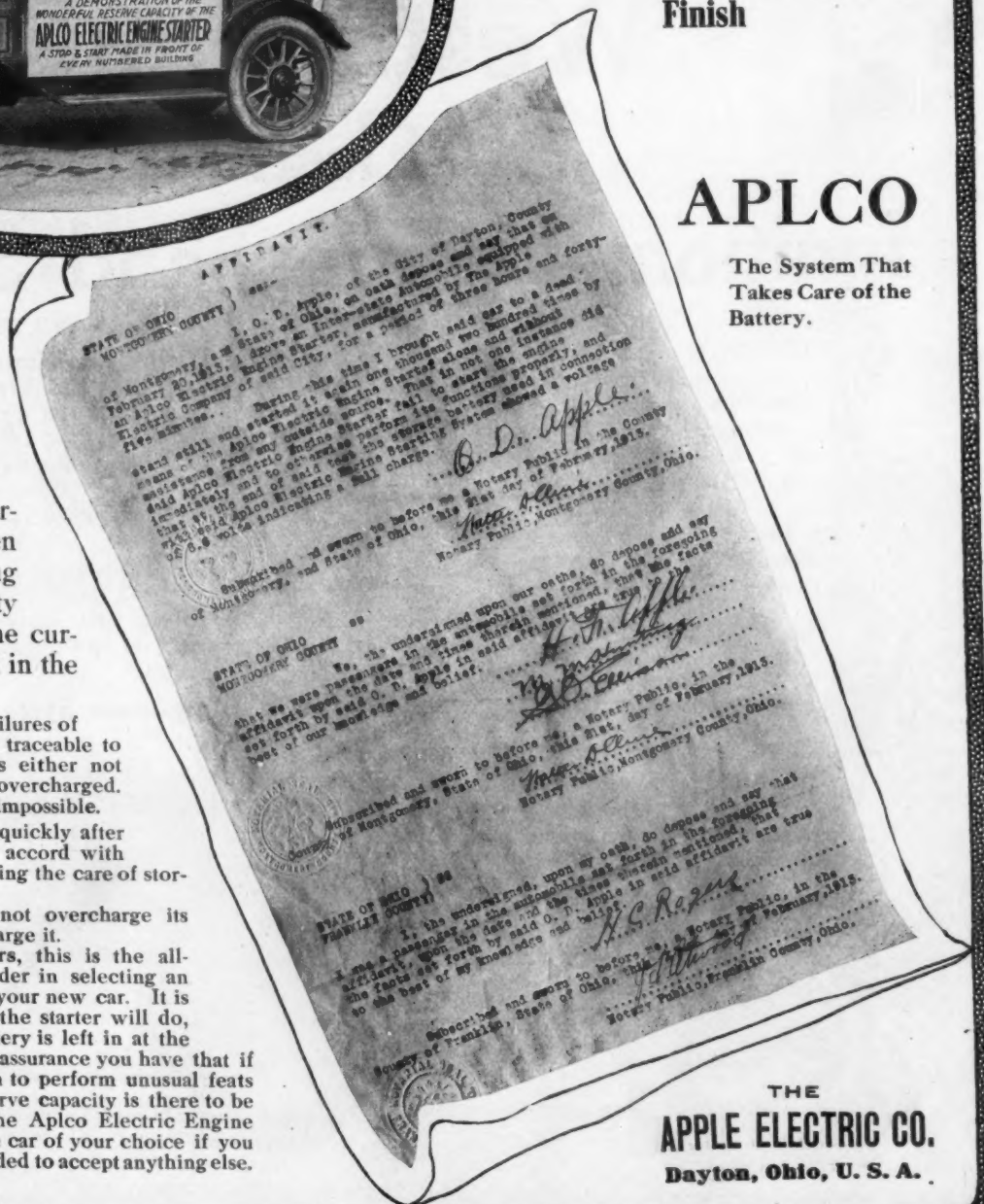
In three hours and forty-five minutes this car was started one thousand two hundred times from a standstill with the Aplco Electric Engine Starter. An average of a start every ten seconds, yet in running a distance of only forty feet between stops the current used was replaced in the storage battery.

Ninety per cent of the failures of Electric Starters is directly traceable to the storage battery. It is either not charged enough or else overcharged. In the Aplco System this is impossible.

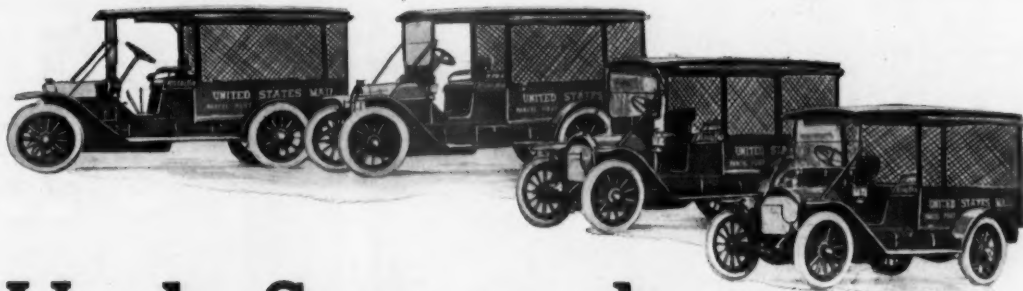
The current is replaced quickly after each start, yet in perfect accord with scientific principles governing the care of storage batteries.

The Aplco System will not overcharge its battery—it cannot undercharge it.

Prospective Car Buyers, this is the all-important feature to consider in selecting an electric engine-starter for your new car. It is not the spectacular stunts the starter will do, but the condition the battery is left in at the end, that counts. It's the assurance you have that if the system is called upon to perform unusual feats of endurance that the reserve capacity is there to be used without fear . . . The Aplco Electric Engine Starter will be put on the car of your choice if you specify it. Don't be persuaded to accept anything else.



THE
APPLE ELECTRIC CO.
Dayton, Ohio, U. S. A.



Uncle Sam sends for ten more KesselKars

The United States Post Office Department, working with might and main to bring the parcels post to the highest efficiency, is perfecting its system with caution. A month's trial of five KesselKar 1500 pound Delivery Wagons in the city of Washington, under the close scrutiny of the Postmaster General, settled *one* question—

Ten more KesselKars have been ordered—that's the answer.

The official O. K. of Uncle Sam is an echo of the sentiment of business men in all lines where the reliable and economical KesselKar Trucks and Delivery Wagons have been adopted.

No matter what may be the special nature of your delivery problem, there's a KesselKar to solve it.

KISSELKAR TRUCKS

1500 lb., 1, 1¼, 2, 3, 4, 5-ton capacity

Hills, ruts, chuck holes, heavy roads, or slippery pavements do not worry KesselKar Trucks. The long stroke motor, four speed transmission and differential lock take care of that.

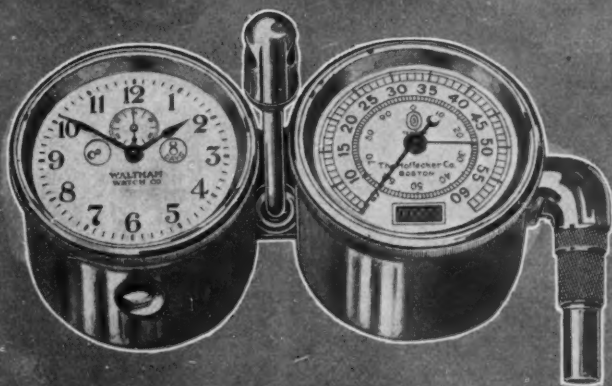
No such *emergency factors* are found combined in other trucks. Some have one of them, some another—but none have all. KesselKar Trucks are good *all the way through*—every inch of construction studied—every principle tested, proved and verified—each part patterned to establish a perfectly balanced strength and stress-resistance.

What KesselKar Service Means.—A responsible institution agrees to take mechanical care off your hands, keep your car "tuned" up, and your depreciation down—and does it. KesselKar Service Buildings and Stations everywhere.

* Illustrated portfolio shows hundreds of KesselKar Trucks in actual service. Free on request.

Kissel Motor Car Co., 121 Kissel Ave., Hartford, Wis.

New York, Chicago, Boston, Minneapolis, Milwaukee, Kansas City,
St. Paul, Los Angeles, Dallas and 200 other leading points



HOFFECKER SPEEDOMETER

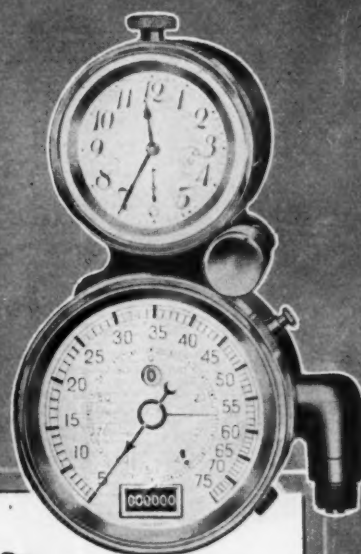
Again Hoffeecker, standard on the famous Apperson line. A wise selection made by the men who built the first automobile and who have been building them for twenty years—men of ripe judgment and the experience of years back of them.

Standard Equipment on

You must take the judgment of car manufacturers, who could not afford to jeopardize the quality of their output through the selection of unreliable parts and accessories.

Hoffeecker Speedometers have proved their superiority in scientific construction, refinement of detail, and artistic appearance—the first two qualities guaranteeing accurate service and long life—the latter adding materially to the appearance of the car.

ECCKER METER



Hoffecker Speedometers embody exclusive features, including a daily trip which can be quickly set to any desired mileage—a fractional mile register—a hand that remains steady regardless of car vibration.

1913 Apperson CAR OUTPUT

You can buy a higher priced speed recorder—but you cannot buy one that offers even one point of superiority over the Hoffecker—a broad statement, but backed by facts.

Specify Hoffecker on the car you buy—your dealer will see that you get it. If your present speedometer is not giving service, order a Hoffecker through your dealer.

Dealers—Investigate the Hoffecker Speedometer—acquaint yourself with the details of its construction, then you will agree that this device will make a good car still better.

THE HOFFECKER COMPANY

Main Office—MOTOR MART

BOSTON, MASS.



C. A. Mezger
**"SOOT PROOF
 SPARK PLUGS"**



**Warranted to be
 Permanently free
 From every trouble
 Common to the
 Ordinary Plug**

"Make It Your Business to See That the Mezger Soot Proof Spark Plug Is the Business End of Your Motor"

Do this and free yourself from every trouble common to spark plugs. We say this confidently, because ten years of successful and ever increasing use of these plugs have proved them immune to short circuit, heat breakage and leaks. It has proved them self-cleaning, and consequently troubleless.

Weak spark and dead plugs are invariable results of soot deposits—that is, unless there is ignition trouble, foreign to the spark plug end of the system.

Mezger Soot Proof Spark Plugs, through exclusive and correct design, make short circuit physically impossible.

Inferior porcelain will crack under violent temperature changes.

Porcelains used in Mezger Soot Proof Spark Plugs are best obtainable, regardless of cost. It cannot break under any heat condition, but only through violent physical shock.

Poor design combined with inferior materials will produce plugs that leak.

Mezger design makes leakage absolutely impossible—for all time. Your study of the construction of the plug will prove this.

The broad and proved claim we make for Mezger Soot Proof Spark Plugs is that they will give years of service. We stand ready to prove this by competitive test, you to put one of our plugs in service together with the balance of a set of some other make. We will abide by the test.

Order these plugs to-day from your dealer. If he does not carry them in stock, he will doubtless get them. If he insists on substitution, then send to us direct. You will amply be repaid in service and satisfaction.

C. A. MEZGER, Inc.

15 Canal Place

NEW YORK

Monarchs of Easy Motion



BRETZ COMPANY
F & S
 Ball Bearings
250 West Fifty-fourth, New York.

When Writing to Advertisers, Please Mention Motor Age.

R-C-H**"Twenty-Five"****Completely
Equipped****\$900****F. O. B. Detroit****THE CAR**

Wheelbase—110 inches.
Motor—Long-stroke, four cylinders cast en bloc; $3\frac{1}{4}$ in. bore, 5 inch stroke. Two-bearing crankshaft. Timing gears and valves enclosed. Three-point suspension.

Steering—Left Side. Irreversible worm gear, 16 in. steering wheel. Throttle control on steering column.

Control—Center Lever operated through H-plate integral with universal joint housing just below. Hand lever emergency brake at driver's right. Foot accelerator in connection with hand throttle.

Springs—Front, semi-elliptic; rear, full elliptic and mounted on swivel seats.

Frame—Pressed steel channel.

Axles—Front, I-beam, drop forged; rear, semi-floating type.

Transmission—Three speeds forward and reverse; sliding gear; selective type.

Construction—Drop-forgings wherever practicable; chrome nickel steel used throughout all shafts and gears in the transmission and rear axle; high carbon manganese steel in all parts requiring special stiffness.

Bodies—Touring car, full five-passenger English type; extra wide seats. Roadster, two passenger, English type.

THE EQUIPMENT

Tires—32x3 $\frac{1}{2}$.
Large gas headlight with Prest-O-Lite tank or generators; oil side and tail lamps. Electric lighting outfit by special arrangement.

High-grade magneto.

Stewart speedometer.

Demountable rims.

Extra rim and holder.

Tally-ho horn.

Jiffy curtains—up or down instantaneously.

Top and top cover.

Windshield.

Tool kit, Jack, Tire repair kit.

Pump.

Robe rail.

Proven and Tested In Every Country

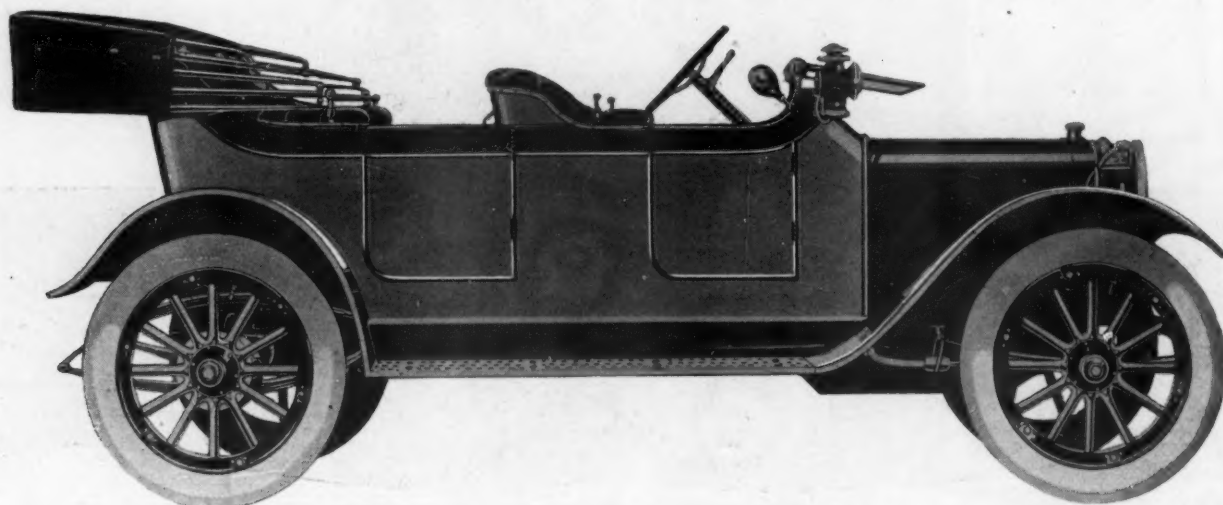
THIS is the car that made good in not one country—but in 45 countries. It stood the big test that proves, demonstrates and vouches for the car, the factories that build it and the men who run the factories. It is proof absolute of R-C-H "Twenty-Five" reliability and dependability any place you take it.

If R-C-H factory production were not RIGHT, how could the car stand the wagon trails and corduroy roads of every automobile country under the sun? And if the R-C-H "Twenty-Five" is not made RIGHT of the very best materials, why do the people of 45 nations buy it?

The R-C-H "Twenty-Five" is the result of ample finances, 100 per cent efficient factory equipment, concentration on one chassis and the making of all working parts in the R-C-H factories.

This car costs more to build than any similar car made and is bigger, better made, more comfortable, more serviceable and more completely equipped than any car below \$1200.

Any R-C-H dealer will prove it. But see him today. Delay means disappointment.

R-C-H Corporation**101 Lycaste Street,****Detroit, Michigan****Represented by Branches and Distributors in all Cities of the World.**

When Writing to Advertisers, Please Mention Motor Age.

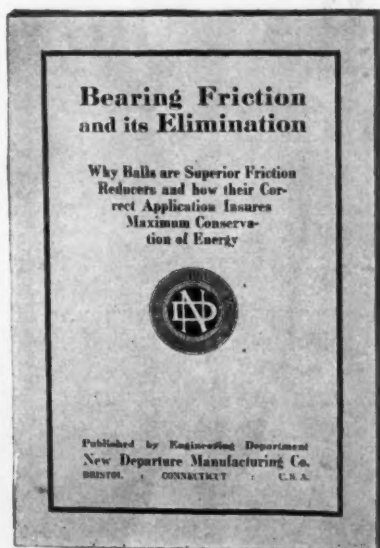
Notice to the Trade

Is hereby given that we will take all necessary steps to sustain our rights in our United States Letters Patent on ball bearings, etc.; and we hereby notify the trade that all infringements will be energetically prosecuted to the full extent of the law.

THE NORMA COMPANY

OF AMERICA

20-22-24 VESEY STREET NEW YORK



Can We Send You A Copy of this Booklet?

Our Engineering Department has published the first of a series of booklets discussing the latest developments in the solving of bearing problems.

This first brochure is entitled "Bearing Friction and Its Elimination," and aims to show why balls are superior friction reducers and how their correct application secures maximum conservation of energy.

The types of bearings particularly discussed and compared in this writing are the ball and roller bearings, as applied to all bearing points in the motor car.

It discusses and explains the growing tendency among engineers and manufacturers to favor the ball type of bearing, as evidenced by the summarization figures published by the "Horseless Age" in a review of 1913 pleasure car models. These figures show that ball bearings are used in the differential of 53% of pleasure cars for 1913, as against 37½% of the 1912 models; in the transmission of 75%, as against 64%; and in the rear wheel of 52%, as against 42%.

This brochure will interest you. Copy will be mailed you promptly on request.

The New Departure Manufacturing Company
Bristol, Conn.

WESTERN BRANCH:
1016-17 Ford Building Detroit



Detroit Trailers

DETROIT TRAILERS Leave Your Car a Pleasure Car All the Time

Just the thing for Contractors, Grocers, Butchers, Laundries, Hardware Stores, Dry Goods Houses, Farmers, Summer Residents, Tourists, etc.

Mr. Dealer—Here is your opportunity to supply the demand in your territory.

Our proposition will interest you. •Let us send you detailed information.

We are the original builders of *Trailers*

DETROIT TRAILER CO., 90 E. Woodbridge Street, Detroit, Mich.



WHY YOU SHOULD BUY GUIDE LAMPS

They are constructed of carefully selected heavy material which must come up to a certain test.

They are made by lamp experts with years of experience in their particular branch of the lamp business.

They are scientifically constructed to give the greatest amount of service, together with maximum efficiency, under all conditions.

Guide

The Lamps With the Great White Ray

They have more points of superiority and advantage than any other make of lamps on the market.

Guaranteed by the makers to give lasting and perfect satisfaction. Your money back if a Guide Lamp fails to make good, after a fair trial.

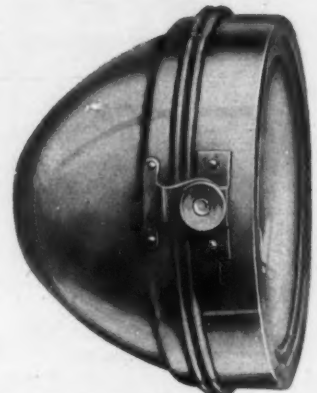
Write today for Guide Book No. 6, and get fully informed about electric lights for automobiles.

The Guide Motor Lamp Mfg. Co.

EAST 4TH STREET

CLEVELAND, OHIO

(18)



GABRIEL

Rebound Snubbers

are the **only** shock-absorbing device adapted to the modern high-set springs now universally used.

They put an end to swinging and swaying of the car body, stop the toss up and bang down.

Unlike other devices they ensure easy riding on rough roads without interfering with spring resiliency on smooth roads.

Easy to put on and require no adjustment thereafter.



Send for Booklet
and particulars of
our Trial Proposition

Gabriel Horn Mfg. Co., 1415 E. 40th St., Cleveland, Ohio

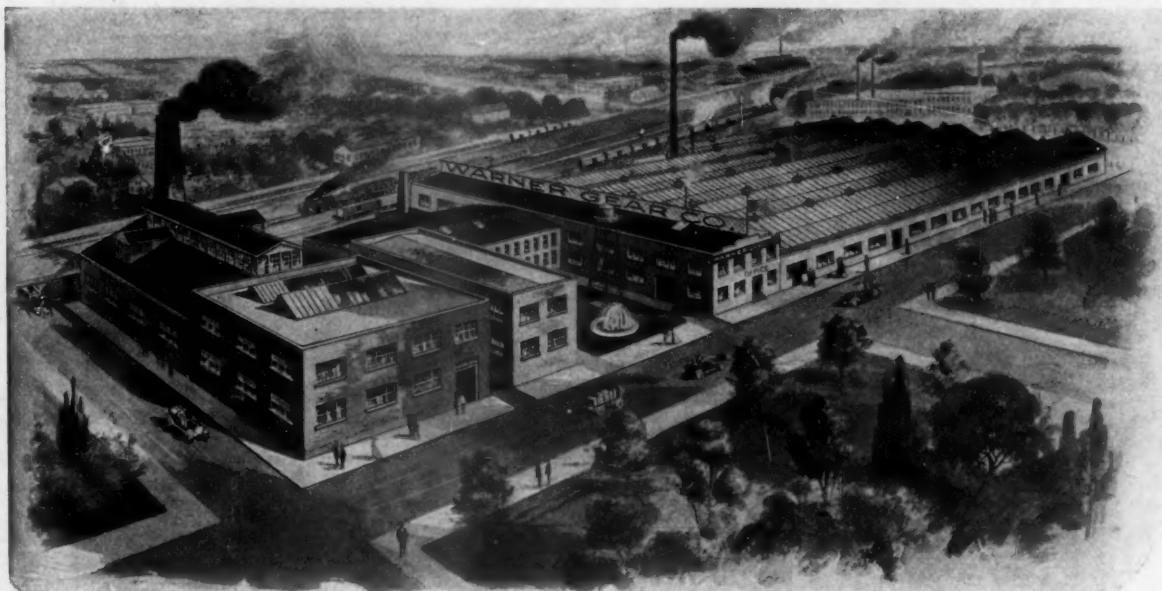
Makers of the famous GABRIEL Musical Horns and Auto accessories

TRANSMISSIONS

CLUTCHES

STEERING GEARS

"The Value of Our Product Is Not in Its Price—But in the Service Rendered"



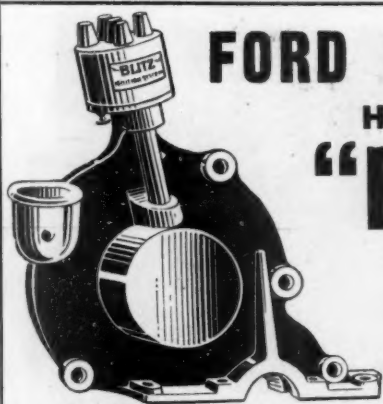
WARNER GEAR COMPANY, Muncie, Ind,

DETROIT OFFICE—628 FORD BLDG.

DIFFERENTIALS

CONTROL LEVERS

When Writing to Advertisers, Please Mention Motor Age.



FORD OWNERS

Here Is The

"BLITZ"

Ignition System

Made for your car

It Stops all of Your Ignition Troubles

No more Sticking of Platinum Points

No more Burned Out Timers

No more Missing. Every miss means a strain on every part of your car, even to the tires.

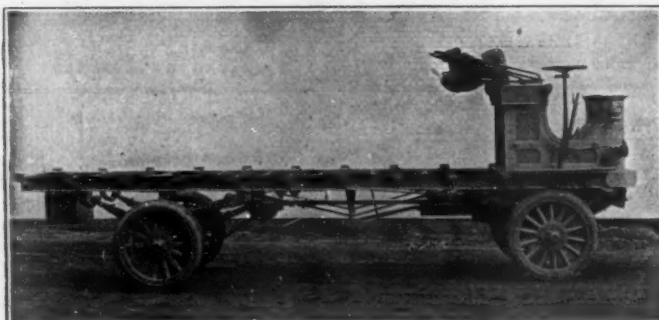
The "Blitz" is a gear-driven sparking device, which fits on the front of the Ford Engine, connects to one unit of the coil on the Dash, and no machine work is necessary to attach it.

Results Count:—Uniform Spark, Perfect Timing, More Power, Smooth Running, Easier Starting.

Positively Eliminates the Back Kick

If your dealer cannot supply you write us. Delivered to any part of U. S. upon receipt of Price, \$26.00.

Electrical Specialties Mfg. Co.
Omaha, Nebraska



Johnson Trucks

1-Ton

2-Ton — Chasses

4-Ton

Write for Specifications

JOHNSON SERVICE CO., Milwaukee

ELECTRIC LIGHTS

at

Low Cost



Suitable Outfits for Easy and Quick Installation on

Overlands

Regals

Briggs Hupp

R. C. H.

Reo

and other cars

Outfits can be installed in four to five hours. Write us for prices and state if you have storage battery or any other lighting equipment that need not be included in outfit.

The Bryan Electric Company, Bryan, Ohio



ABSOLUTELY NEW.

PRONOUNCED BY EXPERTS TO BE THE GREATEST INNOVATION IN AUTOMOBILE TIRES OR TUBES OF ANY OF THE INVENTIONS IN YEARS.

It is built exactly as cut represents.

You will readily observe how such a tube will reduce the liability of puncture.

ELIMINATES PINCHING.

Lessens liability of blowouts; requires less air pressure—therefore, more life to casings, as well as easier riding.

Highest grade rubber.

Sixteen years' experience in its workmanship.

Moulded in the shape in which it is used.

No stretch in the tread.

Almost self-healing.

We have thoroughly tested it in every way and now are pleased to offer it to the public as being an article that will fill a long felt want.

We solicit your inquiries.

Manufactured Exclusively By

KOKOMO RUBBER COMPANY

Dept. D

KOKOMO, IND., U. S. A.



\$1.00

each, from your
dealer or direct

Bosch Plugs

Are Long Lived and Efficient

THE spark plug may seem of no consequence because it is so small, but engineers have always considered it one of the motor's most important efficiency factors, also a point where most troubles are located. Don't leave a path for trouble! The mere insistence on Bosch Plugs gives you not only a perfect plug but one which will eliminate most of your troubles, one that will add just that ounce or two of efficiency which you are so earnestly seeking. Always insist on good plugs—Bosch Plugs—Buy Bosch Plugs only; they are considered by those who know as best.

Write today for "Locating the Spark Plug."
It tells you all you should know about plugs.

BOSCH MAGNETO CO.

214 W. 46th St., New York

Chicago -- Detroit -- San Francisco -- Toronto



PLANT No. 1. BERLIN, GERMANY.

BALL ~



BEARINGS

HB DWF

The Hess-Bright Manufacturing Company
Pioneers in the introduction of Annular Ball Bearings

Most extensive resources and plants in existence devoted exclusively to ball bearing manufacture. Enlarging and improving facilities, product and capacity for distribution.

Main Offices and Plant No. 2 on line of Penna. R. R. to New York
No. 9 E. Erie Ave., Philadelphia, Pa.

PHILADELPHIA
666 North Broad Street

NEW YORK
1974 Broadway

CHICAGO
1800 Michigan Avenue

Stores for Retail Distribution:
CATALOGUE UPON REQUEST





PLANT No. 2. PHILADELPHIA, PENNA.

When Writing to Advertisers, Please Mention Motor Age.

ATTERBURY TRUCKS

Deliver the Goods

THE merchant who is competing most successfully with his business rivals is the merchant who delivers the best goods in the shortest space of time. Modern business demands quick and efficient delivery service. Both these qualities are embodied in the ATTERBURY TRUCK, the standard of commercial car perfection. Our famous one, two and three ton trucks are the marvels of the age.

Send for our booklet on
"How to Deliver the Goods"

Atterbury Motor Car Co., 781 Hertel Ave., Buffalo, N. Y.

GASOLINE AND ELECTRIC CARS, MOTOR
TRUCKS, HOTEL OMNIBUSES, ETC.



Atterbury Model "B"
1-Ton

MAYO SPARK PLUG PUMP

TRY THIS PUMP FREE!

Try it on your car free for 30 days. If it doesn't prove itself worth many times its price—if you think that you can afford to be without it—return our pump and we will return your \$10.00 and no questions asked. That's a fair-square proposition with no strings attached. Write for full particulars.

Instantly attached by substituting for any spark plug. Pumps nothing but pure air. Adaptable for use on all size cars from the smallest Ford to the largest Lozier. Furnished with adapter to fit any car, 12 ft. of hose and connections—

PRICE, \$10.00

(With Pressure Gauge—\$2.00 Extra)

The Mayo Mfg. Company

55 E. Eighteenth St.

Chicago, Ill.



Veeder

The Only Way

to know how much gasoline or "juice" you are using per mile is to have an exact mileage recorder like the VEEDER HUB ODOMETER.

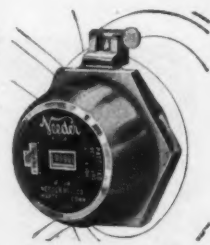
Neat, durable and compact, it can be easily attached. Price complete

\$25.00

At your dealer's, direct from our factory or at the following agencies:

T. H. Cranston & Co., 56 E.
Randolph Street, Chi-
cago, Ill.

Bernard L. Bill, 543 Golden
Gate Avenue, San Fran-
cisco, Cal.



The Veeder Manufacturing Company

C. H. VEEDER, President D. J. POST, Treasurer
H. W. LESTER, Secretary
HARTFORD, CONN.

Makers of Cyclometers, Odometers, Tachometers, Tachodom-
eters, Counters and Small Die Castings

Why The K-W Master Vibrator for Ford Cars?

BECAUSE IT POSITIVELY GIVES

A HOTTER SPARK
A SMOOTHER RUNNING ENGINE
EASIER STARTING

MORE POWER
LESS CARBON DEPOSITS
CLEANER SPARK PLUGS

OVER 36,000 FORD OWNERS HAVE INSTALLED THEM

and more are doing so every day. Watch the number grow monthly. Our Guarantee: Try the K-W Master Vibrator for 30 days and if you can get along without it return it and we will send you your money back and ask no questions. Send for folder.

BE SURE TO GET and Have That Satisfied Feeling



Price,
\$15.00

We make a complete line
of ignition apparatus.

THE K-W IGNITION CO.

2835 Chester
Avenue

CLEVELAND, OHIO, U.S.A.

Agents in All Principal Cities

WE PAY THE EXPRESS
East of the Mississippi River.

BOSTON, Walter J. Forbes, 249 Columbus Ave.

NEW YORK, E. J. Edmond, 1783 Broadway



BALDWIN Chains and Sprockets



run well together; made in a completely equipped plant with an organization skilled in the art by long experience. Manufacturers should have samples and prices of our chains, and allow us to quote on their blue prints for sprockets before placing their 1913 orders. We are prepared to furnish sprockets for replacements for all standard and commercial cars.

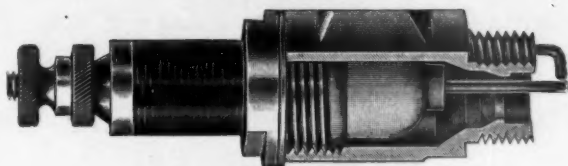
H. V. GREENWOOD, 122 So. Michigan Blvd., Chicago, Ill. C. J. IVEN, Rochester, N. Y. M. A. BRYTE, 788 Mission St., San Francisco, Cal. C. D. SCHMIDT, 416 Broadway, New York City. F. SHIRLEY BOYD, 893 Boylston Street, Boston, Mass.



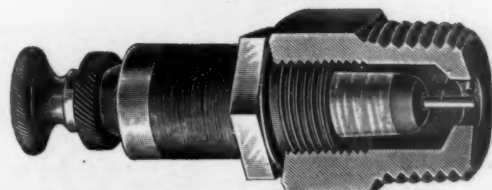
THE OAKES & DOW CO.

SPARK PLUGS

SOOTLESS



COMET



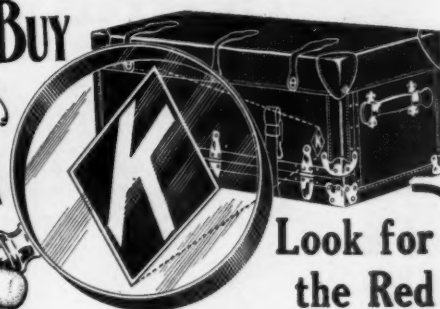
For Highest Compression Engines

In an actual test of 12 best known makes of plugs, our "Sootless" made good—the other eleven could not stand up.

MANUFACTURED AT

15 Chardon Street, BOSTON, MASS.

WHEN YOU BUY
AN
AUTO
TRUNK



Look for
the Red

"K" and Gold "Diamond
on the Front

The red and gold trade-mark shows that it's a genuine Kamlee—the handsomest, strongest, most convenient auto trunk ever made. Light and flexible, yet tough and durable in the extreme, it fulfills every requirement of the touring motorist. New air-tight interlocking edge makes

THE NEW KAMLEE

The Only Really Dust-Proof
and Rain-Proof Auto Trunk

on the market. The edges lock together—rain or dust cannot enter anywhere. A rubber tubing at bottom of interlocking groove conforms to any irregularity or give in top and front. Contents thoroughly protected in any weather. Waterproof covering is fastened over top with patent spring-swivel nuts. No straps to bother with in opening. See it at your dealer's or write us for prices and descriptive booklet. We'll gladly send you a Kamlee on approval anywhere if your dealer can't supply you.



THE KAMLEE COMPANY
234 Broadway Milwaukee, Wis.



THE REACTO

Gives a clear, deep, pleasing note—Insistent, without being abruptly harsh



The Reacto will clear the way on the busiest thoroughfares Equally satisfactory for country driving or city use

A STRICTLY HIGH GRADE HORN, STRONG THROUGHOUT—DUST & WATERPROOF. Send for Booklet 158M

CHICAGO, ILL. THE HOLTZER-CABOT ELECTRIC CO. BROOKLINE, MASS.

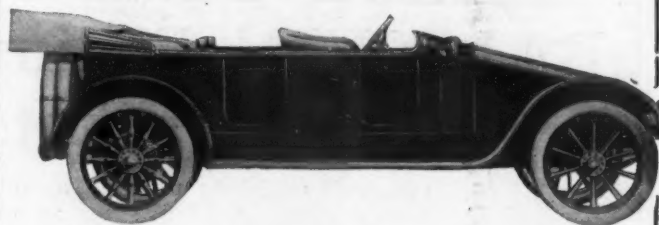
Reasons You Should Use ALL-IN-ONE SPARK PLUGS

- 1.—ALL-IN-ONE Spark Plugs are self-cleaning. In their construction is a priming cup. To clean your spark plugs open this cup, let your motor run, and all soot is blown off the sparking points.
- 2.—ALL-IN-ONE Spark Plugs will prime your motor. Pouring a little gasoline into your priming cups charges your cylinders, starts the stubbornest motor under the most adverse weather conditions.
- 3.—ALL-IN-ONE Spark Plugs are trouble detectors. Simply open the priming cups to find that missing cylinder.
- 4.—ALL-IN-ONE Spark Plugs are efficient decarbonizers. To cut the carbon and gummy deposits in your cylinders and stop that knocking, simply inject a few drops of kerosene through your priming cups.
- 5.—ALL-IN-ONE Spark Plugs won't short-circuit, crack, leak or burn.
- 6.—ALL-IN-ONE Spark Plugs cost no more than ordinary high-class plugs—yet the above advantages they offer make them worth double the price asked for them.



Price
\$1.25
Each

Frontier
Specialty
Company
Buffalo,
N. Y



THE "CROXTON SIX"

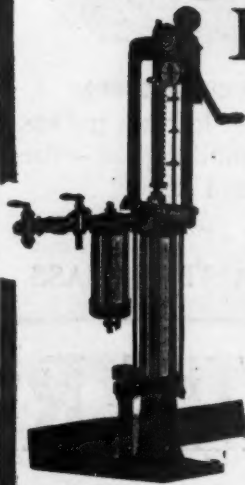
If you have ever owned a car, Croxton construction will appeal to you. Croxton features are not fads—they are proved principles that have been tested by years of service.

The Croxton is made in a full line of models—"Sixes" and "Fours."

You owe it to yourself to write for catalog giving full specifications. Ask for Booklet A-3.

The Croxton Motor Car Co.
Washington, Pa.

BOWSER ECONOMY



Keep your gasoline in evaporation-proof tanks—keep it free from contamination and deterioration — eliminate the chances of loss through spilling and evaporation and you will find that it costs less, insures better service and does away with all danger of loss by fire.

The Bowser Storage System is the safest and most economical method of keeping oil and gasoline. Your engine will run smoother, longer and better if you keep it clean. Saves its cost in the economy of fuel and added life of the car.

Write for free illustrated book.

S. F. Bowser & Co., Inc.
Box 2126, Ft. Wayne, Ind.

New York, Chicago,
St. Louis,
Minneapolis,
Denver,
Dallas, Atlanta,
San Francisco,
Albany,
Harrisburg
Toronto.



When Writing to Advertisers, Please Mention Motor Age.

14,000 MILES ON ONE SET OF J-M Spark Plugs

This is the remarkable record established by Mr. A. L. Westgard on his recent 14,000-mile path-finding trip across the continent. During the entire trip there wasn't a single miss—a single leak—or a single break in insulation.

Do you know of any other plug that could survive a service test like this? And do you wonder we feel safe in guaranteeing J-M Spark Plugs for 10,000 miles?

This is the only plug on the market with a complete double insulation—mica and porcelain. It will spark perfectly with the outer insulation broken—even when current is supplied by a magneto. All parts are baked to prevent destructive expansion. Center electrode case-hardened to withstand highest engine temperatures. Any size can be used for either magneto or battery. Price \$1.00 each, prepaid. Shipped direct if your dealer can't supply you.

Write our nearest Branch for Booklet.

H. W. JOHNS-MANVILLE CO.

Manufacturers of Asbestos and Magnesia Products **ASBESTOS** Asbestos Roofings, Packings, Electrical Supplies, Etc.

Albany	Cincinnati	Kansas City	New Orleans	San Francisco
Baltimore	Cleveland	Los Angeles	New York	Seattle
Boston	Dallas	Louisville	Omaha	St. Louis
Buffalo	Detroit	Milwaukee	Philadelphia	Syracuse
Chicago	Indianapolis	Minneapolis	Pittsburgh	1934

THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED
Toronto Montreal Winnipeg Vancouver



A. L. Westgard, Official Pathfinder of the A. A. A. and the U. S. Office of Public Roads

You'll seldom need the "emergency" if your brakes are lined with



J-M NON-BURN BRAKE LINING

How often do you use the emergency because the foot brakes can't be relied on?

You can depend on your foot brakes to stop your car quickly enough for practically any emergency if they are lined with J-M Non-Burn.

This remarkable lining grips the drum and locks wheels almost the instant you apply the brakes. It never slips. Frictional heat can't burn it. Water, gasoline, oil and grit won't disintegrate it. Made of pure Asbestos fibres interwoven with strong brass wires. Mineral through and through—not a particle of organic matter in it.

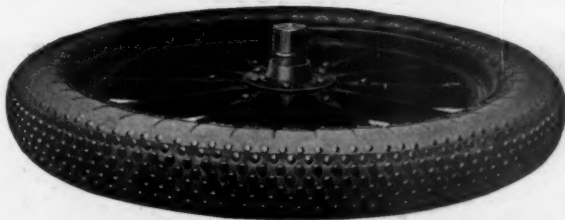
Look for the name on every piece—and don't take a substitute. If your dealer can't supply you, we'll ship direct.

Write nearest Branch for Sample and Booklet.

H. W. JOHNS-MANVILLE CO.

Albany	Cincinnati	Kansas City	New Orleans	San Francisco
Baltimore	Cleveland	Los Angeles	New York	Seattle
Boston	Dallas	Louisville	Omaha	St. Louis
Buffalo	Detroit	Milwaukee	Philadelphia	Syracuse
Chicago	Indianapolis	Minneapolis	Pittsburgh	1934

THE CANADIAN H. W. JOHNS-MANVILLE CO., LTD.
Toronto Montreal Winnipeg Vancouver



Guaranteed 5,000 Miles Without Puncture

With Durable Treads we give a written guarantee for 5000 miles without puncture. This is binding whether your tires are new or old, tread-worn, rim-cut or rut-worn. They are the only protectors built to do so.

Durable Treads reduce the cost of your tire up-keep 50%. They save delays and troubles. They absolutely prevent skidding, without injuring your tires.

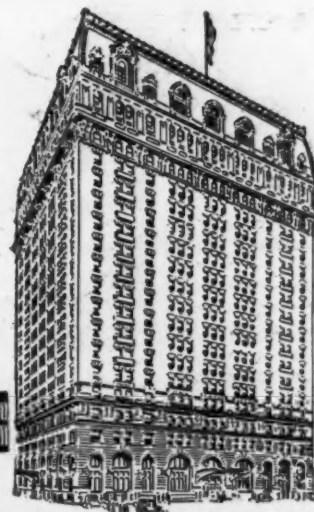
Durable Treads

cost half the price of tires. They make your tires wear three seasons instead of one. We let you test Durable Treads at our expense—you send no money—promise nothing. Write us at once for details of test plan, special discount, sample, etc. Learn how Durable Treads save you \$50 to \$200 each season.

COLORADO TIRE & LEATHER CO.

1128-A Karpen Bldg., Chicago, Ill.
1848-A Acoma St., Denver, Colo. 524-A W. 34th St., New York
435-A Golden Gate Ave., San Francisco, Calif.

THEY PREVENT SKIDDING



Hotel La Salle

CHICAGO'S FINEST HOTEL

ERNEST J. STEVENS, Vice-Pres. and Mgr.

Located in the heart of the city, within easy reach of all railway terminals

RATES

ONE PERSON	Room with detached bath...	\$2 to \$3 per day
	Room with private bath...	\$3 to \$5 per day
TWO PERSONS	Room with detached bath...	\$3 to \$5 per day
	Room with private bath...	\$5 to \$8 per day

TWO CONNECTING ROOMS WITH BATH

Two persons	.....	\$5 to \$8 per day
Four persons	.....	\$8 to \$15 per day
SUITES	.....	\$10 to \$35 per day

LA SALLE AT MADISON STREET, CHICAGO

JUST AS GOOD AS SE-MENT-OL

CARBONOX

THERMITE

BRASS-KOTE

TIRE-LAC

NEVER-BURN

NEVER-RUST

PIONEER BRAND



Chemically correct carbon remover. Loosens the carbon after which it is blown out through the exhaust.

Prevents freezing of water in radiator at 70 degrees below zero — used effectively diluted one-half.

Air drying brass enamel.

Chemically correct tire paint.

Perfect engine and boiler enamel.

Strictly all right rim paint. Top Dressing Valve grinding Compound Auto body Polish.

The NORTHWESTERN CHEMICAL CO.
MARIETTA, OHIO.

HERZ PLUG

1894-1913

**Twentieth
Year**

The only possible plug for high-grade motors. Adds richness and class to the cheapest car.

The only plug in the world that is or can be

**Guaranteed
A Full Year**

Beautiful, Unbreakable
BLUE ENAMEL STONE
Protected Terminal

Your Dealer, or—

HERZ & CO.
295 Lafayette St. New York.



**All will agree that
an air-cooled glove
is the coolest for
summer motoring**

And you will agree, after a fair trial, that Grinnell Auto Gloves are the *best* you can buy for many reasons—smoothest fitting, lightest feeling, smartest looking, longest wearing.

No other leather is so soft, flexible, tough and serviceable as the "Reindeer" and coltskin from which these gloves are cut.

**Grinnell
Gloves**

Grinnell-Gloves

Sold with a Bond

They are ventilated

on the back by rows of tiny holes, to admit the cooling air but not the dust—keeping the hand at all times cool and dry.

The Grinnell patented "Rist-Fit" improvement (a "V" of soft leather in the cuff, with a simple strap adjustment) makes the glove "fit fine at the wrist" and keeps the distinctive gauntlet always in place—it can't sag.

Grinnell Gloves give you the most for your money in class, comfort, service. Every style and size for all occasions—motoring, sporting, street and dress wear. See them at your dealer's. If he doesn't carry them

Write for Free Glove Book, samples of leather, and our "Pair on Approval, Prepaid," offer.

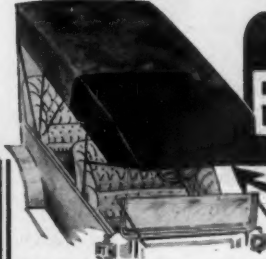
Morrison-Ricker Mfg. Co.
Established 1856

64 Broad St. GRINNELL, IOWA



Style
V 4400

**This Top can be
Easily Preserved
To Look Like This.**



Is your auto top "rusty"—does it leak?

You can make it good as new for a \$5.00 bill. It certainly is worth while to know about a product—that will save you \$30 to \$60, the price of a new top; that'll give your top the classy appearance of being new or make it absolutely waterproof again.

Rub-R-Tite Auto Top Waterproofing

Easily and quickly transforms a worn Mohair, Pantasote or Rubber Top into practically a new one. It gum-surfaces the fabric with a waterproof, flexible, durable coating that will neither crack, peel nor rot. Easily applied with a brush by your garage man, chauffeur or yourself—experience not necessary. You can get two or three times the usual wear out of a new top if you'll occasionally apply RUB-R-TITE reduced with equal parts of gasoline.

If your top is worn outside, it is probably spotted inside—you can soon remedy that, too. Just dye it an even clean black with

Rub-On Lining Dye

Put on with a sponge without removing the top. Does not separate or rot the fabric but spreads and goes into it, insuring an even color that will not run or wash out when the top is wet.

Every Can Guaranteed to Satisfy

These two products, with our other auto aids, are all standard goods. You should keep them on hand as you do gasoline and oil. They will economically and satisfactorily preserve or renew the good appearance of your car and save you money, trouble and repair bills.

Send us a postal for full information. Samples of work and prices, FREE. Send us name of your dealer, too.

Rub-On Manufacturing Co., 563 Elm St., Buffalo, N.Y.
ATTRACTIVE PROPOSITION FOR LIVE DEALERS

Elyria-Dean

TRADE MARK

TUTO 2-TONE HORN

Electrically transmits two different and distinct sounds; the degree of sound being regulated by the pressure of the thumb upon one button located on the steering wheel. One tone gives polite notice, the other says "Danger!" in unmistakable terms. Complete with button and cord, \$25.00. Elyria-Dean products manufactured only by

THE DEAN ELECTRIC COMPANY
504 OLIVE STREET ELYRIA, OHIO, U. S. A.

"Look for Elyria-Dean where Quality's seen."

Premier

See advertisement on back cover of this publication
March 13th



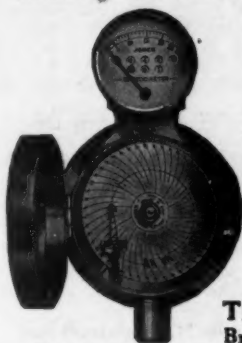
NARCO
TIRE CUT FILLER

Heals Tire Cuts
The Motorists Self-Vulcanizer

Fills the cuts and holes, solidifies quickly and becomes like a part of the tire. Easy to use—clean cut, fill with Narco T. C. F., allow to stand over night. Result—a new tire. \$1.00 the tube—anywhere.

National Rubber Company
4411 Papin St. St. Louis, Mo.

Are Your Trucks Efficient?



You can only determine by record of performance. Human records are not reliable—

The Jones Recorder

furnishes reliable performance records. The record is in the form of a graphic chart—easily interpreted and easily understood. The lines on the chart tell the story of speed, of starts, of stops, of distances, of loading and unloading intervals.

It is the means for the elimination of waste in the delivery organization.

Write for further information.

THE JONES SPEEDOMETER

Broadway at 76th Street, New York
Plants, Bush Terminal, Brooklyn, N. Y., New Rochelle, N. Y.

Sanford

One Ton Truck Chassis, \$1660

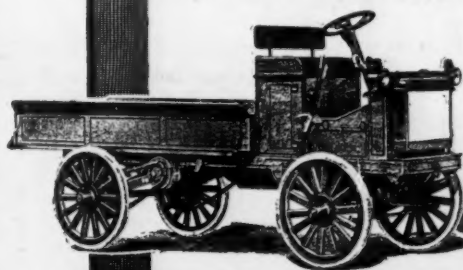
This sturdy truck is actually doing its work at a very low cost. Many users are getting fifteen miles per gallon of gasoline consumption.

We have a mighty interesting proposition to live dealers

SANFORD MOTOR TRUCK COMPANY

Fayette, St. Marks and Erie Streets
SYRACUSE, N. Y.

Export Dept., 17 Battery Place, New York



\$1660.



STAPLEY

TIRE PUMP

Always Ready
Always Works

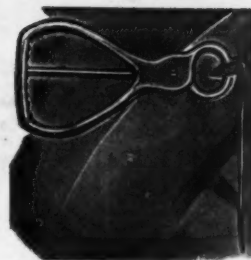
The STAPLEY is a compound pump. Has seamless brass tube cylinders, non-leakable joints, automatic valve and heavy cast base. A Guaranteed tire pressure gauge if you want it.

Price without gauge	With gauge
\$4.00	\$6.00

BRIDGEPORT BRASS COMPANY
P. O. Station A. Bridgeport, Conn.

GILMER Tire Repair Pliers

are as necessary to Car Users as a pocket knife is to you—as useful as a hair pin to a woman. There are 800,000 Car Owners in the United States who KNOW that it pays to repair small cuts in Tires. ARE YOU ONE OF THEM? Hadn't you best write for free copy of "Tire Insurance," or better, send a dollar for a pair of nickel plated PLIERS and combination cleaner and cotter pin hook? They will pay for themselves the first seventy-five miles. They will pay for a set of Tires every 4,000 miles. We guarantee satisfaction.



G. Walker Gilmer, Jr.

53 N. 7th St., Philadelphia, Pa.

Pliers opened, distending cut for cleaning, tool applying gum. Ratchet in handle holds Pliers open. (Pat.)

Type A

Wisconsin

CONSISTENT

Motors



Real masterpieces of engineering skill. Note their special features—examine their perfect construction.

Large Bearings	Large Valves	ALL 4 CYCLE—IN 5 TYPES 3 1/4 inch bore, 5 inch stroke, 4 cylinder 4 1/4 inch bore, 5 inch stroke, 4 cylinder 4 1/4 inch bore, 5 inch stroke, 6 cylinder 4 1/4 inch bore, 5 1/2 inch stroke, 4 cylinder 5 1/4 inch bore, 7 inch stroke, 4 cylinder
Perfect Lubrication	Ample Water Jacket	
Double Ignition	Perfect Workmanship	
Heavy Crank Shaft	Long Stroke	

Write us and we will tell you where a Wisconsin Motor may be seen.

WISCONSIN MOTOR MFG. CO., Dept. 25, Milwaukee, Wis.



Grips—But Never Slips

TRADE MARK

Raybestos

REG. U.S. PAT. OFF.

"THE ORIGINAL AND BEST ASBESTOS BRAKE LINING"

RAYBESTOS makes your brakes dependable, and your car safer.


The Royal Equipment Company

Railroad & Bostwick Aves. Bridgeport, Conn.

We also make Duplex and Raymond Brakes and Gyrex, the Mixer.

CONNECTICUT

Shock Absorbers




"Make Every Car a Parlor Car"

Send for Catalog No. 25

CONNECTICUT SHOCK ABSORBER CO., INC.
Meriden, Conn.

SECTIONAL VIEW

Care and Repair of Tires



GET THIS AUTOTIRE BOOK FREE

Here is a handy little book brimful of practical points which every automobile owner wants to know. Gives all kinds of information about tires—how to prevent troubles, how to repair best, quickest and at least expense. Tells about the wonderful machine, the


SHALER

Electric Vulcanizer

"It Makes One Tire Outwear Three." The Shaler repairs any kind of puncture, cut, blow-out or tear in any outer casing or inner tube. Automatic—makes a perfect weld. Never burns or undercures. For garage or home use, direct or alternating current, or for road use with alcohol. \$10 up. Costs 1/2¢ per hour to operate. Absolutely guaranteed. *Send Your Name Today* and we will mail our interesting tire book "Care and Repair of Tires." Gives a remedy for every tire emergency, it's free postpaid.

Garage and Repairmen should also write for our money making hand book.

C. A. SHALER CO., 312 4th St., Wausau, Wis.



WINTON SIX

Our Service Delights Car Owners

Winton Six owners, and especially those who formerly owned other makes, declare that Winton Service is the utmost that any owner could desire. The difference between our Service and the other kind is fully set forth in our booklet, "The Real Meaning of Service." Shall we send you a copy?

THE WINTON MOTOR CAR CO.
424 Berea Road, Cleveland, O.

World's First Maker of Sixes Exclusively



RAJAH GIANT PLUG


Extra strong and heavy. Perfectly simple—only four parts, which are easily taken apart for repairs or replacement. Only highest grade, imported, hard fire porcelains used. Minutely accurate, well finished machine work. No thumb screws—a Rajah Clip Terminal supplied with every Plug. Price, \$1.50 postpaid—the most economical Plug made. Two sizes—1/2-inch and 3/4"x18. Send for catalog.

Rajah Auto Supply Co., Bloomfield, N. J.

John Millen & Son, Ltd.—Montreal, Toronto, Vancouver, Winnipeg.

The Right Kind of Cable

The difference between cars that require little attention and cars that require constant attention generally lies in the kind of cable used in wiring the car. Be on the safe side and use



Costs Less in the End

If you're not using Packard Cable, write today for new two-color circular describing 27 different kinds of cable to suit every automobile need.

THE PACKARD ELECTRIC CO.
Dept. C, WARREN, OHIO

KINGSTON CARBURETORS

|| Save Money by Economizing Gasoline ||

Five floating bronze ball valves opening automatically under different motor suction supply a uniform mixture at any speed, regardless of hot, cold, wet or dry weather.

Write for details and let us tell you why so many manufacturers are adopting this carburetor as standard equipment

Made by the oldest manufacturers of carburetors in America.

ESTABLISHED 1895

BYRNE, KINGSTON & CO., Kokomo, Ind.

Marion

Touring Cars	Roadsters
37-A	36-A
30-40 H.P. \$1475	Bobcat \$1425
48-A	38-A
48 H.P. \$1850	30-40 H.P. \$1475

All cars completely equipped
ELECTRIC STARTER—ELECTRIC LIGHTS

THE MARION MOTOR CAR COMPANY
902 Oliver Avenue, INDIANAPOLIS

Is There a PAIGE

Dealer In Your Territory?

If not, write or wire us today. The Paige "36" at \$1275 and the Paige "25" at \$950 are the leaders in the popular price field. You want them, if you can get them.

PAIGE-DETROIT MOTOR CAR CO.
394 Twenty-First Street, DETROIT, MICHIGAN



ZENITH

Gives Standard Carburetion

ZENITH CARBURETOR CO.
DETROIT, MICH.

The Detroit—\$850

FULLY EQUIPPED

Five Passenger Touring Car



25 H. P. Long Stroke Motor

Enclosed Valves, Three Point Suspension, Unit Power Plant, Platform Rear Springs, Full Floating Rear Axle, Left Hand Drive, Center Control, Drop Frame, Large Tires, Complete Ball Bearing Car

BRIGGS-DETROITER COMPANY, 455 HOLBROOK AVE., DETROIT, MICH.
WRITE FOR SPECIFICATIONS



Transmissions

made by Specialists

COVERT TRANSMISSIONS GIVE perfect service, because they are designed and built by men thoroughly acquainted with every requirement that is made by a motor car transmission.

For Commercial Vehicles of from 500 to 10,000 lbs. capacity.

For Pleasure Cars of from 20 to 60 H. P.

Covert Motor Vehicle Co.
Sales Office—Detroit, Mich.
Factory—Lockport, N. Y.



AMERICAN UNDERSLUNG

WE have published a very interesting book on the advantages of Underslung construction. It is of value to dealer or individual. It tells of our full line which ranges in price from \$1475 to \$4500. Write for a copy today.

American Motors Company
Dept. H Indianapolis, Indiana

Warner Auto-Meter

MAGNETIC PRINCIPLE

95% of all the speedometers to be made during 1913 will be built on the magnetic principle.

Warner Auto-Meter Factory, Beloit, Wis.
Branches in all principal cities all over the world

HAVOLINE OIL

FOR PROPER AUTOMOBILE LUBRICATION
"It Makes a Difference"

PERFECTLY FILTERED ALWAYS BURNS CLEAN
INDIAN REFINING CO., Distributors

MAIN OFFICES
17 Battery Place
New York City



SOLD BY
All Garages
All Dealers

**AWAY WITH
← THAT
GET THIS →**



by installing an Electric Lighting System produced by the
WELLS GENERATOR
 operated by button from driver's seat.
It is cheaper than gas—and more reliable.
 It always produces correct amount of current.
 WRITE FOR BOOK
 R. C. WELLS MFG. CO., Wells Bldg., FOND du LAC, Wis.

We Are the Largest and Oldest



**Makers of Spare
Tire Cases,
Brackets, Lamp
Cases, &c., in the
United States.**
*The Gilbert Line is
Standard. Don't
accept Substitutes.*
GILBERT MFG. CO., New Haven, Conn.
 New York Store, 2010 Broadway, Cor. 68th St.

**O.B. GEAR DRIVEN AIR COMPRESSOR
NO. 2**

We guarantee this compressor to inflate a 36x4 tire in 90 seconds and other tires in proportionate time. It will compress air to 250 lbs. as easily as 10 lbs. It runs equally well placed in any position. It will last a lifetime, needs no attention, has very few moving parts, and is constructed on right principles, which are covered by patents. Piston rings and bevel seated valves used throughout. For inflating tires and operating air starting devices it has no equal. Can be installed on all leading cars—most factories will furnish them when requested.



**UNIVERSAL
MFG. CO.**
 308-10-12 9th St., So.,
 Minneapolis, Minn.
 Chicago Agency
 Motor Car Supply Co., 1461 Mich. Ave.

Red Head
 REG. U.S. PAT. OFFICE
MAGNETO PLUG



**All Sizes
All Styles
Porcelain
or Mica \$1.00**
EMIL GROSSMAN COMPANY
 Manufacturer
 250 WEST 54th ST.
 NEW YORK
 Detroit Branch and Factory
 844 Woodward Avenue

Oakland
 The Car with a Conscience
OAKLAND MOTOR CAR CO.
 PONTIAC MICHIGAN

Four & Six
Cylinders
\$1000.
to
\$3000.
Write for
Literature



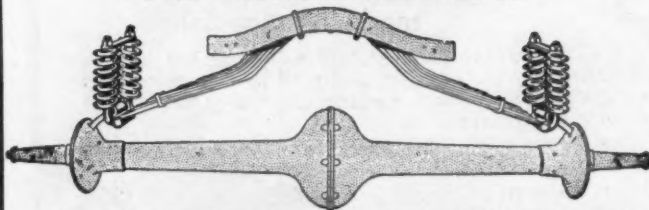
STUTZ

The Stutz Is Made Right
 from the radiator to the rear axle. Every
 ounce of material—every detail of workman-
 ship, that goes into every Stutz car is abso-
 lutely the best.

Write today for advance booklet A-2 Sturdy
 STUTZ Announcement, Series B.

IDEAL MOTOR CAR COMPANY
Manufacturers of Stutz Cars
 Indianapolis Indiana

**THE CAHILL
FORD SHOCK ABSORBER**



Especially designed for Ford cars. Insures easy riding, prolongs the life of the car and makes motoring luxurious. \$10 complete for rear.
 Special propositions for Ford agents.

APPROVED AUTO SPECIALTIES COMP'Y
 1731-1737 BROADWAY, NEW YORK 37D

KEETON
 DETROIT U.S.A.

"SIX-48"
 \$2750
 Fully
 Equipped
Riverside Touring Car



Write for Booklet

Keeton Motors Ltd. **Keeton Motor Co.**
Brantford Ont. *Lawton & M.C.R.R.*
Canada. PHONE WAL 1067 *Detroit U.S.A.*

GET Acquainted WITH EAGLEINE NO-KARBON OIL



EAGLEINE NO-KARBON OIL possesses less than one-half the carbon and other impurities contained in all other cylinder oils. It's a lubricating wonder. Its use means a clean motor.

EAGLE OIL & SUPPLY CO.
104 BROAD ST., BOSTON.
114 W 37TH ST., CHICAGO, ILL.

B. A. Gramm's Motor Trucks

Newest Designs; Latest Improvements; Built in every detail to insure satisfactory and permanent results.

Write for photographs, descriptive literature and the exceptional values we offer you—far beyond all others.

The Gramm-Bernstein Co.
Exclusive Motor Truck Builders
Lima, Ohio, U. S. A.



We Ship On Approval
PREPAY EXPRESS AND ALLOW
30 Days' Free Trial

The best "Nonskid" puncture-proof device for automobiles, commercial cars and motorcycles.

Try Them At Our Expense
Be your own judge—don't take any one's word for it. "The proof of the pudding is in the eating."

Perfect Score in 4 Glidden Tours
Twin Cities to Fargo, N. D., 1909.
Twin Cities to Helena, Mont., 1911.
New York City to Jacksonville, Fla., 1911.
Twin Cities to Winnipeg, 1912.

It only costs one cent to learn our prices and guarantee on "Bricton" Detachable Treads.

Write Today for Full Particulars
The Bricton Mfg. Co.
1233 Main St. BROOKINGS, S. D.

Studebaker

Studebaker dealers have cars to answer satisfactorily every demand.

"25" Five Passenger.....\$ 885
"35" Six Passenger.....1290
"SIX" Six Passenger.....1550

The Studebaker Corporation - Detroit, Mich.

Arson Trust Bust

By Our
"Go To Blazes"
Fire Extinguishers

\$1.00 Each



Absolutely
Fatal for Fires

Dealers, Write for Special Prices
The Motor Car Equipment Company
55 Warren Street NEW YORK

No Automobile is Completely
Equipped without it.

The Stewart Piston Gasoline Saver
Saves up to 40%
(20% Guaranteed)

INCREASES POWER INCREASES SPEED
SAVES YOUR BRAKES

Price \$6.50 Anywhere in the U. S.
Ask your dealer, or write us.

HALLIWELL CO.
408 West Pico Street, Los Angeles, Calif.



\$975

CAMERON CARS

1913

5 passenger touring car; starts from seat; left-hand drive; center control; 112-inch wheelbase; famous CAMERON motor, long stroke (3 7/8x5), 4-cylinder, 30 H. P., water-cooled; 4 forward speeds; French type hood. Price complete, \$975.

Write for full details and agents' terms
THE CAMERON MFG. COMPANY, Beverley, Mass.

INTERLOCKS

Double Your Mileage

INTERLOCKS make new tires wear twice as long, or give you an extra season's wear out of old tires.

More than that, Interlocks give you confidence that you will not have blow-outs, rim cuts or punctures to spoil your motoring pleasure.

Interlocks are complete inner tires—not inner shoes—placed between the outer casing and inner tube to strengthen the casing and protect the tube from punctures. They insure safety—make new tires give twice the usual mileage, and add 1000 to 5000 miles to old ones. Don't affect resiliency.

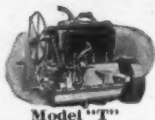
Car owners and dealers—write for our booklet giving facts about road tests, prices, testimonials, and our 1913 proposition.

DOUBLE FABRIC TIRE CO., 128 W. 9th Street, Auburn, Ind.

MR. SELLER, DO "MR. BUYER" a favor:
Sell him the car he naturally wants.
Don't sell him the car he has to be educated
to want. Sell him the car with the



We were in business 25
years ago and if you
should want an inter-
changeable part 25
years from now we
intend to be in busi-
ness to supply it.



Model "T"

You don't have to "get
at" a BUDA very
often; but when you
do, you'll appreciate
its exclusive
"get-at-ability."

All the details are yours if you write to

BRANDENBURG & CO.

1108 S. MICHIGAN AVE.
CHICAGO.

57TH AND BROADWAY
NEW YORK CITY.

FORD BUILDING
DETROIT.

SHELDON

**AXLES & SPRINGS
ARE
INVINCIBLE**

THE SHELDON AXLE CO.
WILKES-BARRE, PA.
CHICAGO OFFICE: 68 East 12th Street.
DETROIT OFFICE: 1215 Woodward Ave

Prest-O-Lite

when empty, can be immediately exchanged for
a full one, ANYWHERE and ALWAYS. Imita-
tions can not.

Prest-O-Lite is in universal use and demand,
and its owner can always sell it for about what
it cost. Prest-O-Lite is the only accessory that
does not become second hand.

Prest-O-Lite can be profitably and safely
handled by any dealer. Imitations can not.

The Prest-O-Lite Co. 233 East South St.,
Indianapolis, Ind.
Canadian General Office and Factory, Merriton, Ont.

Save Your Tires



Preserve your tires. Increase tire
mileage. Make your tires look bright,
white and new. Coat them with Pre-
serv-O Tire Paint. Penetrates into
every cut and crevice of the casing,
leaving the tire coated with a new,
perfectly waterproof surface. Dries in
15 minutes and then cannot rub off.
Cannot harm tires. Economy, as well
as pride in the appearance of your
car, dictates the use of Preserv-O
Tire Paint. The best tire paint on the
market. A trial will prove it. Pint
can, enough to coat six big tires, 50
cents. Get a can today of your
dealer, or send us \$1 bill for 2 cans,
express prepaid. You run no risk.
Money back if not satisfied.

Atlas Auto Supply Co., 3243 W. Lake St., Chicago

Get acquainted with the standardized "Cole"

the car that is writing gasoline history.

Learn what the

Cole franchise for dealers



will mean to you if you happen to be
located in open territory.

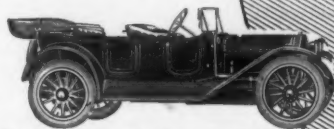
Cole Motor Car Co. of Indianapolis

The 6-Cylinder, Reasonably Priced

de Soto Six 55 H.P.

The car with a stronger appeal than any
recent product of the trade—the one that
meets a popular demand. We have an un-
usually attractive proposition for dealers.
Write at once for free catalog and full
particulars.

Sells for
\$2,185



de Soto Motor Car Company, Auburn, Ind.

McFARLAN

Electric
Lighted

SIX

Self
Starting

SERIES "S"—45 H. P., 2, 4 and 5 Pass.—\$2,300
SERIES "T"—50 H. P., 2, 4 and 5 Pass.—\$2,500
SERIES "M"—60 H. P., 2, 4, 5 and 7 Pass.—\$2,750

New Six Passenger, Coupe and Limousine
Bodies slightly higher.

TERRITORY OPEN FOR PROGRESSIVE DEALERS

Pioneer Six-Cylinder Car Builders of America

McFARLAN MOTOR CAR CO., Connorsville, Ind.

20th Century Emergency Patch

Guaranteed to give satisfaction or purchase price re-
funded. You to be the JUDGE. Made from toughest
Chrome Leather, studded with Steel Rivets, will hold



any Blow-
out or Rim-
cut. Put
two in your
tool kit,
leave your
extra cas-
ing at
home. Spe-
cial propo-
sition

for jobbers and dealers. WRITE US.

20TH CENTURY TIRE PROTECTOR COMPANY

Main Office and Factory, Midlothian, Texas
DALLAS OFFICE CHICAGO OFFICE
Pacific & Olive Sts., Dallas, Tex. 1400 Michigan Ave., Chicago, Ill.

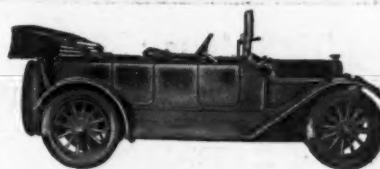
RUDGE-WHITWORTH DETACHABLE WIRE WHEELS

*Fitted With HOUK Quick
Detachable Rims*

Make for greater resiliency, smoother riding. Save tires. Are quickly and easily removed. Practically indestructible. Absolutely rust-proof. Now being manufactured in America by the Standard Roller Bearing Company, of Philadelphia.

GEO. W. HOUK CO.
5002 LANCASTER AVE., PHILADELPHIA, PA.

Type 35
Series
G and H



Electric
Starting
and
Lighting

MERCER THE CHAMPION LIGHT CAR

When motor car efficiency, power, durability, and speed are mentioned, all eyes focus on the Mercer.

Descriptive literature sent on request

Mercer Automobile Co. 800 Whitehead Road
TRENTON, N. J.

EVERYTHING ELECTRICAL for AUTOMOBILES



PITTSFIELD

Western Electric SPARK PLUGS

Include plugs for every style and type of engine—

PORCELAIN MICA MICA-PORCELAIN
with all sizes of thread.

BOOKLET ON REQUEST

Manufactured by PITTSFIELD SPARK COIL CO.

Distributed by WESTERN ELECTRIC CO.
Offices in All Principal Cities

SCHAFFER BALL BEARINGS

MADE IN GERMANY

SOLD IN AMERICA



When you buy SCHAFFER BALL BEARINGS you are not experimenting because SCHAFFER BALL BEARINGS have for years been recognized as the standard of bearing quality. They are made in Germany of the best steel, and are now in universal use throughout the world.

BARTHEL & DALY

42 BROADWAY

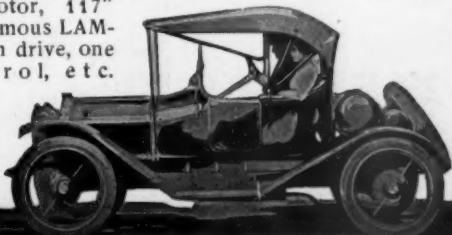
NEW YORK

The LAMBERT

at the head of its price class. Rutenber motor, 117" wheelbase, famous LAMBERT friction drive, one lever control, etc. Write for catalog.

BUCKEYF MFG. CO.
ANDERSON, IND.

The LAMBERT Model 99 (5-passenger touring car or 2-passenger roadster) at \$1365 (fully equipped) stands. It comprises 4 1/2 x 5 1/4



MODEL 99 2 PASS.
ROADSTER

THE ONE-MAN TOP



CAN BE HANDLED BY ONE PERSON AS EASILY & QUICKLY AS AN UMBRELLA

INSTANTANEOUS PROTECTION

GOLDE-PATENT MANUFACTURING CO. 513 W. 56th ST. NEW YORK.

DECATUR 1 1/2-TON TRUCK



Write for catalog and complete specifications telling why DECATUR TRUCKS are best

GRAND RAPIDS MOTOR TRUCK CO.
GRAND RAPIDS, MICHIGAN

The Truck with a reputation for Economy Efficiency Durability and Low Operating Cost. Our Trucks are used in sixty-one different lines of business.

Dorris

Built to Last

THE SILENT CAR

BUILT TO LAST

Our agency proposition will interest you. Write for it.

DORRIS MOTOR CAR COMPANY

100 S. Sarah Street

St. Louis, Mo.

Wasting Tire Money That's what you're doing when you allow water and sand to work into the fabric through small cuts and bruises, rotting them and causing blow-outs.

THE GIBNEY Eleck-Trick Vulcanizer

seals these cuts and makes tubes and tires run double and treble the usual time

Easy to Operate—It Operates Itself

An illustrated book, telling how to double the life of your tires, awaits your request for it.

JAMES L. GIBNEY & BRO.

215-217 North Broad Street, PHILADELPHIA, PA.
248-252 West 54th Street, NEW YORK CITY



Michener's Chain Carbon Remover



Pat. April 2, 1912.

This carbon remover is a small, flexible chain, made of tough soft wire, 90% copper, manufactured especially for this device; is as flexible as a piece of twine and I guarantee it absolutely harmless to the motor.

This device saves the expense of tearing down the motor, eliminates disturbing the bearings and adjustments which are difficult to secure again; does not scratch or nick the cylinders which a sharp edge tool is likely to do in the old hand scraping way.

Has had the most wonderful sale of any accessory on the market the past three years and steadily increasing.

Recommended by manufacturers and garages. Get two to clean your motor quickly—you can clean two cylinders at one time. State kind of motor when ordering.

Price 75c; 3 for \$2.00

Get them from your Dealer

Now sold everywhere

or if your dealer cannot supply you I will send direct, postpaid.

E. S. MICHENER, Washington St., New Castle, Pa.

The Searchlight Gas Co.

1016 Karpen Building

Chicago, Illinois.

Stronger than ever, legally, financially and in the esteem of the trade. Watch us grow.

BRANCHES AND REFILLING STATIONS:

Warren, Ohio.	San Francisco, Calif.	Los Angeles, Calif.
Chicago, Ill.	Buffalo, N. Y.	New York City.
Detroit, Mich.	Atlanta, Ga.	Syracuse, N. Y.
Camden, N. J.	Dallas, Texas.	Minneapolis, Minn.
Philadelphia, Pa.	San Antonio, Tex.	Toronto, Canada.
Kansas City, Mo.	Boston, Mass.	Indianapolis, Ind.

ZERO-40

THE IDEAL RADIATOR FLUID
A Natural Mineral Water. Guaranteed
Not to Freeze at 40 Below Zero

As harmless to metals and rubber as ordinary water. Evaporation is replaced with ordinary water, but leakage must be replaced with Zero-40.

ZERO-40 in your car removes the possibility of damage either by frost or corrosion.

We will send under the above guarantee a five-gallon can of Zero-40 to any address in the United States, charges prepaid, on receipt of five dollars.

DEALERS—Write to us for the address of our nearest distributor who is under contract to supply you in any quantity.

AUTOMOBILE EQUIPMENT COMPANY
Dept. 2 225 East Jefferson Avenue, Detroit, Mich.

TIMES SQ. AUTO CO.

NEW YORK

1710-1718
BROADWAY

CHICAGO

1210 to 1212
MICHIGAN AVENUE

NEW CARS
USED CARS
MOTORS
BODIES
TOPS AND
EVERY
ACCESSORY
FOR THE
AUTOMOBILE

From 20c to 50c
on the dollar

We are the
Largest Dealers in the
World
in
New & Used Cars
and
Factory Cleanups

**The New
Swinehart**

KEATON NON-SKID TREAD
has four times the wearing service of the ordinary non-skid. Users will tell you that they have run Swinehart Keaton Non-Skid Tread Tires a whole season without having them lose their anti-skid effectiveness. Call at any one of our stores and investigate them. We also make a complete line of Smooth Pneumatic Tires of best quality. Branches and distributing agencies in all leading cities.

SWINEHART TIRE & RUBBER COMPANY
1208 North St., Akron, Ohio

Model 5-A \$1700
Touring Car Fully Equipped

People who demand POWER, ENDURANCE, LUXURY and SAFETY in a motor car, drive the time-tested GEARLESS TRANSMISSION CARTER CAR. Presented in four excellent models \$1600 to \$2000.

Cateccar Company, Pontiac, Michigan
Branches: New York, Detroit, Chicago, Kansas City, Atlanta

Electric Cranking and Lighting

Inter-State

MODEL 45, \$2750

6 Cylinder, Left-hand Drive,
Center Control,
132-inch Wheel Base.

INTER-STATE AUTOMOBILE CO.
MUNCIE, INDIANA

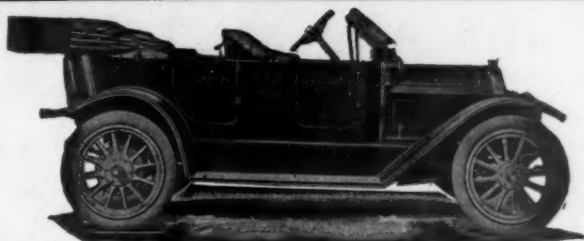


Patented

Manufacturers Don't omit a SPARKS of 1913 Models: WITHINGTON.

Fan from your 1913 specifications. Our One-Piece blade, ball-bearing, radiator fan assemblies cool the motors of more high-class cars than any other fan on the market. There's a reason. SPARKS-WITHINGTON Fans deliver the greatest volume of air with the least H. P. consumption of any fan obtainable. Furthermore, their one-piece construction is positive insurance against blades which loosen, become detached and fly off. Undoubtedly one of our ten standard models is just what you have been looking for. Catalogue and detailed blue-prints on request. Get in touch with us.

The Sparks-Withington Co.
JACKSON MICHIGAN - WALKERVILLE, CAN.



Marathon Automobiles

America's most comprehensive line. Every car completely equipped. 3 sizes chassis—10 body styles. Price range from \$875 to \$1800

Write for Catalogue M-A

MARATHON MOTOR WORKS, Nashville, Tenn.

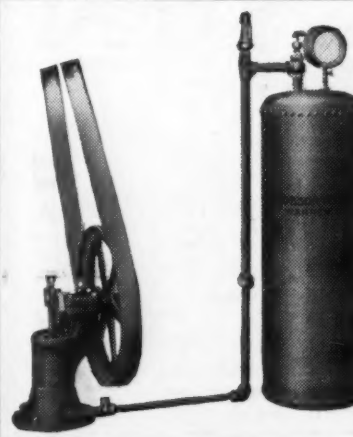
EISEMANN

Has Always Led

Ask us to tell you about the wonderful new pole pieces and the Automatic Control Magneto.

THE EISEMANN MAGNETO COMPANY

Indianapolis, Ind. New York Detroit, Mich.
514 N. Capitol Ave. General and Sales Office 803 Woodward Ave.
225-227 West 57th St.



Air Compressors

For Private and Public Garages

Single and Double Cylinders
Air and Water Cooled Types

Jacobson Machine Mfg. Co., Warren, Pa.
HASTINGS & ANDERSON CO.
Chicago, Ill.
Western Representatives

BUFFALO ELECTRICS

PLEASURE CARS.

Model 29—Runabout.....\$2,600
Model 30—Coupe.....2,900
Model 30-B—Brougham.....3,000

TRUCKS.

2,000-lb. Chassis.....\$2,200
4,000-lb. Chassis.....2,800

F. O. B. Buffalo.

Buffalo Electric Vehicle Company

1220 Main Street

Buffalo, N. Y.

Correspondence with dealers solicited

HAYWOOD STEAM VULCANIZERS

THE PROFIT MAKING PLANTS



The vulcanizing system that DOES NOT use air bags. SOLID PADS and HEAVY CLAMPS are the means through which pressure is generated.

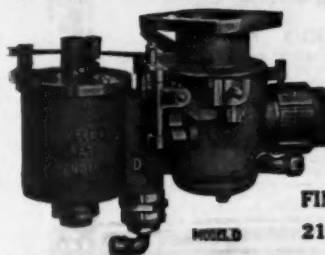
Plants from \$25 to \$500

Write for Catalog B.

HAYWOOD TIRE & EQUIPMENT COMPANY
524 N. Capitol, Indianapolis, Ind.

RAYFIELD

The Better Carburetor



FOR

All Makes of Cars
All Kinds of Weather
All Grades of Gasoline

FINDEISEN & KROPP MFG. CO.
21st and Rockwell Sts., Chicago, Ill.

MARMON

"The Easiest Riding Car in The World"

Marmon "32"

Four cylinders, 32-40 h.p., 120-inch wheel-base, electric starting and lighting system, left-hand drive, center control, nickel trimmings, with newest body types to meet every requirement and corresponding equipment.

\$2,850 to \$4,100

Marmon "48"

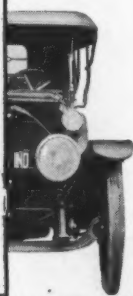
Six cylinders, 48-80 h.p., 145-inch wheel-base, electric starting and lighting system, left-hand drive, center control, nickel trimmings, with body types to meet every requirement and corresponding equipment.

\$5,000 to \$6,350

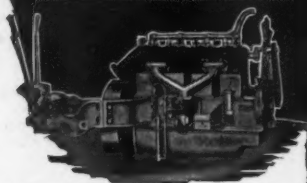
Detailed Information on Request

Nordyke & Marmon Company
Indianapolis (Established 1851) Indiana

"Sixty Years of Successful Manufacturing"



Model Motors



Afford the utmost in reliability and power—with the least weight and fuel consumption. You can add much value to your car by using the Model Motor. We make them better and at less cost than you can, because we specialize in motors and power units. Write us for facts.

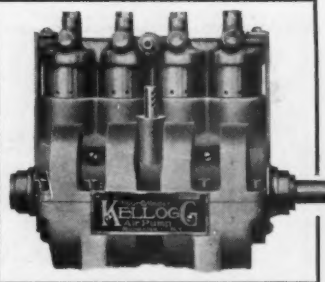
Model Gas Engine Works

PERU, INDIANA

CADILLAC OWNERS

by inquiring of their agents will find attachments all ready for the

Four Cylinder
KELLOGG
Air Pump



to be installed on their cars. The only power tire pump endorsed by the leading engineers as meeting all requirements.

Cadillac agents should write for special proposition

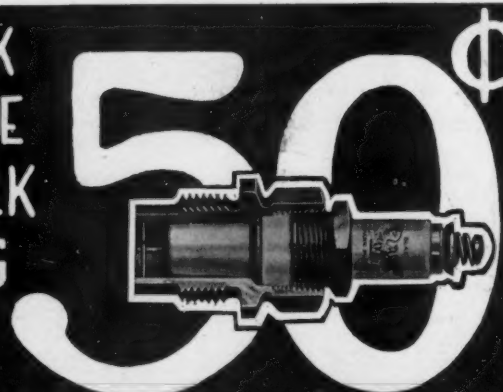
KELLOGG MFG. COMPANY
33 Circle Street Rochester, N. Y.

SALISBURY

AXLES WHEELS
TRANSMISSIONS

W & S Salisbury Wheel & Mfg. Co.
JAMESTOWN, N.Y.

BLACK
EAGLE
SPARK
PLUG



The STANDARD COMPANY Torrington, Conn.

The **U-S-L** Electric Starter & Lighter takes the place of the fly-wheel.

The **U-S-L** Storage Battery (vehicle type) insures lively electric cars and powerful and economical trucks.

The **U-S-L** Storage Battery (sparker type) means a never failing spark for engine ignition.

The U. S. Light & Heating Co.

General Offices: 30 Church St., NEW YORK CITY
BRANCH OFFICES AND SERVICE DEPOTS
NEW YORK BUFFALO DETROIT ST. LOUIS
BOSTON CLEVELAND CHICAGO

HENDERSON

"The Car of Your Dreams"

Six Models
\$1,285 to \$1,685



HERE is truly a car of today. Such features as Ward Leonard Electric Self-Starter, Dynamo Electric Lights, Single Lever Center Control, Left Side Drive and Gasoline Tank Under Cowl, are all built into the car. They are not "afterthoughts"—tacked on. Henderson Wire Wheel models are designed with special hubs making them interchangeable with wood wheels. The automobile buying public is not slow to appreciate such cars at such prices. This is evidenced by our dealers everywhere.

Some territory still open—write for terms.

Henderson Motor Car Co.
of Indianapolis, U. S. A.

SPLITDORF

"Always There"

Plugs may come and plugs may go, but SPLITDORF PLUGS go sparking on forever. Make a clean sweep—equip with SPLITDORF, as SPLITDORF PLUGS need no cleaning.

Write TO-DAY for new catalogue

SPLITDORF ELECTRICAL CO.

98 Warren Street, Newark, N. J.

When Writing to Advertisers, Please Mention Motor Age.

Great Western
FORTY
1913 FULLY \$1585
EQUIPPED
LUXURY — POWER
ABSOLUTE SILENCE
 WRITE FOR OUR NEW CATALOGUE
GREAT WESTERN AUTOMOBILE CO.
 DEPT. 20 PERU, IND.

HESS AXLES

¶ HESS Axles have been on the market but 2 years. Fourteen car manufacturers in that short time exclusively adopted them as regular equipment.

¶ Renewals of HESS contracts for 1913 from past users and an increasing HESS demand among new manufacturers, is ample proof of the stability of HESS Quality.

¶ May we be of service to you? Write us.

THE HESS SPRING & AXLE COMPANY
 CARTHAGE, OHIO, U. S. A.

PULLMAN

The PALACE CAR of MOTORDOM

In offering the PULLMAN car to the motoring public, we have endeavored to supply a quality car at a moderate cost. Our line comprises the following models, each one embodying all the PULLMAN features brought up to perfection by PULLMAN experience: 4-36, \$1,875; 4-44, \$2,150; 6-66, \$2,750. "All our models are equipped with electric self-starter and lighting systems."

We have a wonderful agency proposition. Write today.

PULLMAN MOTOR CAR CO. 238 N. YORK, PA.
 GEORGE ST. YORK, PA.



STANWELD RIMS

The only demountable rims that positively prevent tire wobbling. No special tools needed for operation. No unnecessary loose parts. Detaching feature independent of demounting mechanism. Will accept either straight side or clincher tires. Used as standard equipment on America's finest cars.

THE STANDARD WELDING CO
 CLEVELAND O

**W
A
R
N
E
R**

We Specialize in High-grade Automobile Parts

**Transmissions
 Steering Gears
 Gear Shift Levers
 Differentials
 Electric Starters**

The Warner Manufacturing Co.
 TOLEDO, O.

**T
O
L
E
D
O**

Be Prepared

to meet the demand we are creating for you on the

NEW POSITIVE LOCK STOP TWITCHELL AIR GAUGE



"TIRE INSURANCE FOR \$1.00"

The best, simplest, most accurate, most durable and most easily read tire gauge on the market

The Twitchell Gauge Co.
 1201 Michigan Avenue Chicago, Illinois

M^cCUE WIRE WHEELS

Add a Big Percentage
of Tire Mileage

Strong, Resilient, Indestructible

These wheels are equipped with  Standard Spokes, made by the Standard Company of Torrington, Conn.

THE M^cCUE COMPANY
 Buffalo New York

Look At Our New Middle Name

PENNSYLVANIA Oilproof VACUUM CUP TIRES

Pennsylvania Rubber Company
 JEANNETTE, PA.

Branches—Coast to Coast



DON'T THROW AWAY YOUR OLD TIRES COVER THEM WITH STEEL AND USE THEM FOREVER

SKID BLOWOUTS RIMCUTS PUNCTURES WEARING OFF OF RUBBER NIT

Each section 2 in. wide. They hook to rims. Try two or three sections over any old blowout. Special prices to the first in new territory

KIMBALL TIRE CASE CO., 173 BVD., COUNCIL BLUFFS, IA.



S. R. O.
Oldest and Leading European
Ball Bearing

—o—o—
Mea Magneto
—o—o—

Write for Particulars
and List of Users

MARBURG BROTHERS, Inc.
Sole Importers

Detroit 1790 Broadway, New York Chicago



Cutting
Motor Cars

Five passenger touring car...\$1475
Two passenger roadster....\$1475

The same chassis is used for both models

Wide-awake dealers write or wire for our remarkable dealer's proposition.

CUTTING MOTOR CAR CO.
300 Mechanic St., Jackson, Mich.



Eliminate Your Tire Trouble

You can have the same riding comfort in your electric as you have now and without the constant dread of punctures and blowouts, by using

Ideal Steel Wheels
(Resilient)

"It's in the Spokes"

Equipped with solid rubber tires they make any car ride as easily as wooden wheels and pneumatic tires. The shocks are absorbed through a series of elliptical spokes of chrome vanadium steel.

Guaranteed to double the life of any tire, pneumatic or solid. Furnished for any motor driven vehicle. Write for literature today

Ideal Steel Wheel Co., 1000 First Nat'l Bank Bldg., Cincinnati, O.

Cut Gears of Quality Complete Differentials

The
**NEW PROCESS
GEAR CORPORATION**
SYRACUSE, N. Y.

STRENGTH from Chrome Vanadium Steel costing us many times ordinary steel prices; oil tempered, not merely flashed in oil or chilled in water, the old wrong way for tempering. Tested physically to withstand 40 tons to the square inch without taking a permanent set, there is no equal to

Cleveland-Canton "Chrome Vanadium" Automobile Springs

Combine flexibility and strength to best meet all strains, jars or vibration from load, road, or engine. For Motor Trucks, Tractor Engines, Auto Cabs and all Motor Vehicles. Give Longest Service and

SAFETY

Best Grade: "Chrome Vanadium." Next Best: "Special Analysis."

THE CLEVELAND-CANTON SPRING CO., Canton, Ohio



MOTOR TRUCKS

THREE EXCEPTIONAL MODELS:

Model ED—1,000 lbs. capacity (2 cyl.)	\$ 750
Model B—1,000 to 2,000 lbs. capacity (4 cyl.)	1,100
Model C—2,000 to 3,000 lbs. capacity (4 cyl.)	1,775

Write us for full information and liberal specifications.

THE DART MOTOR MANUFACTURING CO.
WATERLOO, IOWA (18)

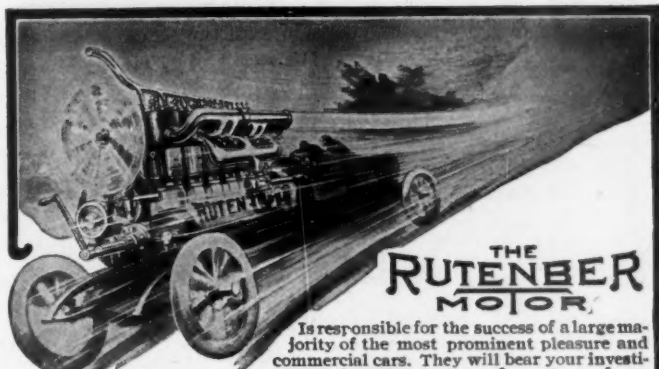
Our Engineers

Are ready and anxious to consult with you at any time on any plan or print.

WESTON MOTT & CO.

FLINT, MICH.

Oldest and Largest Manufacturers of
Automobile Axles, Hubs and Rims in the World



THE RUTENBER MOTOR

Is responsible for the success of a large majority of the most prominent pleasure and commercial cars. They will bear your investigation before the purchase of any type of car. Literature upon request.

RUTENBER MOTOR CO., Marion, Indiana

Large photograph of the above cut for framing 14c in stamps.

Mosler Spit Fire Plugs are the BEST

FOR 13 YEARS HAVE BEEN LIKE THIS

INSIST ON OUR
GENUINE PLATINUM POINTED PLUGS

A. R. MOSLER & CO.,
P. O. BOX "M," MT. VERNON, N.Y.



*Republic Staggard Tread
Tires represent the
acme of non-skid
efficiency
The Republic Rubber Co.
Youngstown - O.*

STAVER

Power, comfort and exceptional beauty are three of the features of Staver Cars. The extraordinary values are emphasized by their complete equipment.

STAVER LINE

Staver "45"—5 Pass. Touring Car. Price...\$1875
Staver "65"—4 Pass. Touring Car. Price...\$2250
Staver "55"—5 Pass. Touring Car. Price...\$2250
Staver "65"—6 Cyl., 6 Pass. Touring Car...\$2750

We offer an especially liberal proposition to dealers.

Write us

STAVER CARRIAGE COMPANY
76th and Wallace Sts., Chicago, Ill.



STAR BALL RETAINERS

STAR BALL RETAINERS are famous wherever ball bearings are known. The best bearing service attends the car equipped with STAR BALL RETAINERS. We also manufacture more thrust bearings than any concern on the market. Send us your requirements.

THE STAR BALL RETAINER CO.
LANCASTER, PA.



The Brake Lining of QUALITY
Safest—Surest
Best Wearing

MULTIBESTOS

means
Sales to the Dealer
Safety to the Owner

Write for booklet

STANDARD WOVEN FABRIC CO.
WORCESTER, MASS.

Chicago, 1420 Michigan Blvd.
New York, 276 Canal St.
Philadelphia, 1427 Vine St.
Boston, 903 Boylston St.
San Francisco, Fred Ward & Son.

THE ROBBINS SEDAN BODY

You have seen it—and admired it. Probably you did not know that it was a Robbins body. Probably you have wondered whose design and construction produced that handsome Sedan.

For your own comfort, you will need a Sedan body this winter.

LET US DESIGN IT.

IRVIN ROBBINS & COMPANY

Address Sedan Dept. 10th and Canal, Indianapolis, Ind.

Weed Chains

Absolutely Prevent Skidding

Necessary on Rear Wheels
Advisable on Front Wheels

For your own safety—for the safety of the public, fully equip your car with Weed Chains

AT ALL DEALERS

Weed Chain Tire Grip Co.

28 Moore St.

New York

THE MAYER CARBURETOR

Gives the motor the right mixture at varying speeds, is the most economical, reducing gasoline expense a full 25 percent. And with the MAYER you can get from 15 to 30 percent more power from your motor than with 90 percent of the other carburetors on the market.

Write for catalogue No. 26E and learn the merits of the MAYER

MAYER CARBURETOR COMPANY
2673 Main Street, . . . Buffalo, N. Y.

GOOD YEAR

AKRON, OHIO

This name on Automobile Tires and Rubber Accessories signifies inherent qualities of material and workmanship that insure the maximum of service at the minimum of expense. (878)

THE GOODYEAR TIRE & RUBBER CO.
AKRON, OHIO



Patented
Jan. 23, '12.
Aug. 20, '13

I Want You to HEAR This Musical Auto Horn

I know there isn't anybody who can describe the chime-like signal of the Aermore Horn to you. So I want you to hear it—

The AERMORE Exhaust Horn

—the horn harmonious

I want you to write me and I'll tell you where and how you can hear the singing, organ-like tones of the Aermore. Just drop me a postal.

G. V. P. Lansing, President.

AERMORE MANUFACTURING COMPANY
Dept. 5578, 1536 Michigan Blvd. CHICAGO, U. S. A.

You Can Walk From There to Anywhere.

THE WOODSTOCK

The Hotel of Comfort

43rd St., Just East of Broadway, New York



Our new addition is ready for occupancy. We now have 360 rooms with 265 baths. Write us for descriptive folder with typical floor plan and rate card. Wire for reservation at our expense.

Rates

From \$2.50 to \$4.00 Per Day

W. H. VALIQUETTE
MANAGER

Also The Berwick, Rutland, Vt.

The Pilot "THE CAR AHEAD"

Three Great Models: Pilot 40—Four cylinders, 4½x5; brake test, 58 horse-power; 120" wheel base; price, \$2000. Pilot 50—Four cylinders, 4½x6; brake test, 59 horse-power; 126" wheel base; price, \$2250. Pilot 60—Six cylinder, 4x6; brake test, 67 horse-power; 132" wheel base; price, \$2500.

The Car Without a Mechanical Defect

Testor "T" head motors, full floating rear axles, Brown-Lipe differential, Warner transmission, Elsemann magneto, Stromberg carburetor, handsome jewel bodies with ventilating windshield. Completely equipped, with every convenience and comfort. Dynamo electric lighting and electric starter (Gray & Davis system), power tire pump. We have the greatest agency proposition in the United States.

Write for our beautiful art book showing cars in detail
PILOT CAR SALES COMPANY, Richmond, Indiana

LOZIER

A LOZIER FOR \$3,250! (A Self-Seller)

A completely equipped Light Six which will meet the big demand for a really high-class car of this type.

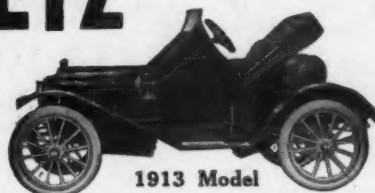
Dealers from coast to coast who have investigated the LOZIER "Self-Seller" say it is the greatest motor car value they have ever seen.

Some good territory is still open

Write or wire for our proposition

LOZIER MOTOR CO., DETROIT

METZ "SPECIAL" \$445



1913 Model

COMPLETELY
EQUIPPED

LEFT-HAND DRIVE
CENTER CONTROL

22½ H. P., 4-cylinder water-cooled motor, Bosch magneto, standard artillery wheels, best quality 80"x3" clincher tires, extension top, wind shield, five lamps, gas generator, tools, etc. Makes 5 to 50 miles per hour on the high speed, 28 to 32 miles on 1 gal. of gasoline. A thoroughly practical, fully guaranteed car. You can secure EXCLUSIVE SALE in your territory.

Send for Book "K."

METZ COMPANY, Waltham, Mass., U. S. A.

Hupmobile


"32" Touring Car\$1000
6-Passenger Touring Car 1200
"32" Roadster 1000
"32" Covered Delivery 1100
20 H. P. Runabout 750

All Models F. O. B. Detroit. Fully Equipped.

Literature sent upon request

HUPP MOTOR CAR COMPANY
1228 Milwaukee Avenue Detroit, Mich.

Imperial



INVESTIGATE
These Five Great Cars NOW

Imperial Offers Unusual Values for 1918

MODEL 32.....\$1285	MODEL 33.....\$1285
MODEL 34.....\$1650	MODEL 44.....\$1875

MODEL "SIX"—60.....\$2500
Supreme in Beauty and in Constructional Merits

Imperial Automobile Co., Jackson, Mich.



Braender Tires & Tubes

Are of the highest quality and the cheapest on mileage.

They are built to last. Ask any user.

ESTABLISHED AGENTS SOLICITED


Send for Price List and full particulars

BRAENDER RUBBER & TIRE CO.

Main Office and Factory **RUTHERFORD, N. J.**

Salesrooms: 1987 Broadway, N. Y.
1211 Bedford Avenue, Brooklyn, N. Y.

Bull Dog Non-Skid



The Emblem of Efficiency

For Actual Service **CHASE TRUCKS** Give Constant Satisfaction

SIX MODELS 500 TO 4000 POUNDS CAPACITY
ALL STYLES OF BODIES

Up to two tons capacity the Chase line is the most complete and varied shown anywhere.

For catalogue and further information, address

CHASE MOTOR TRUCK COMPANY
332 S. West Street, Syracuse, N. Y.



JACKSON AUTOMOBILE CO.
1207 EAST MAIN STREET, JACKSON, MICHIGAN.

Jackson

NO HILL TOO STEEP
NO SAND TOO DEEP

"OLYMPIC" \$1500
4 cylinders
"MAJESTIC" \$1975
4 cylinders
"SULTANIC" \$2650
6 cylinders

ELEKTRA
ASBESTOS FRICTION


FOR BRAKES AND CLUTCHES

Over 1,000,000 feet of material produced by our PATENTED PROCESS in daily use.

High coefficient of friction gives greatest factor of safety in operation of all brakes and clutches and OUR PATENTED PROCESS produces the only HIGH-FRICTION facing.

THIS MATERIAL gives better satisfaction and wears longer than any other facing and is especially adapted for manufacturers' use; our BAND LININGS, as well as RINGS and CONES for CLUTCHES, being formed ACCURATELY to shape and size.

F. L. Horton Mfg. Co.
36 Whittier Street, Boston, Mass.

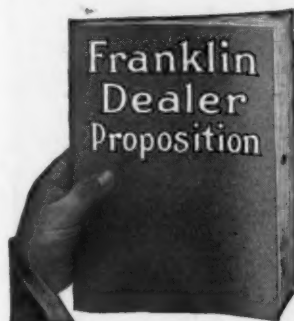



Here is a copy of the new edition of "Lubricating the Motor."

It explains the theory and practice of graphite lubrication with Dixon's Automobile Lubricants and is illustrated with photographs of famous racing drivers who use them. Ask for copy No. 82G. Free upon request.


Joseph Dixon Crucible Co.
Jersey City, N. J.

Write For This Franklin Dealer Proposition



FRANKLIN six-cylinder models now equipped with Entz Electric Starting and Lighting. A real self starter with original features. Franklin cars use less gasoline, less oil, no smoke, fewer tires, travels faster, rides easier, silent, powerful, flexible, beautiful. Get the Proposition.


Franklin Automobile Co., 27 Franklin Sq., Syracuse, N. Y.



Ford
THE UNIVERSAL CAR

We have had to double our gigantic output—and the demand is more than doubling. Nearly 180,000 have been sold and delivered. New prices \$525 to \$800. Dealers everywhere. Ford Motor Company, Detroit, Michigan.

Your Motor Car!



Electric Starter
Electric Lights
Center Control
Complete Equipment

Nyberg

**SIX \$2000
FOUR \$1650**

NYBERG AUTOMOBILE WORKS

Northern Factory: Anderson, Indiana
Chicago Branch: 2437-2439 Michigan Ave.
Southern Factory: Chattanooga, Tenn.

Economy is too big a matter to be found lurking in cheap prices.



TRADE MARK
NON-FLUID OIL
REGISTERED
UNITED STATES PATENT OFFICE

Costs more than other lubricants for bearings and gears but its use reveals true Economy in dollars saved on repairs and in Efficiency retained in your car.

NEW YORK & NEW JERSEY LUBRICANT CO.
165 Broadway, New York
Chicago, 1480 Michigan Ave. Philadelphia, 1431 Vine St.

THE KENTUCKY THOROUGHbred—"AMES 45"

Long stroke, powerful Continental Motor—Electric (Dynamo) Lights—Self Starter—Left Hand Drive—Full Equipment—"Amesbilt" Bodies and Tops. A combination of power, speed, endurance and graceful lines. Price, fully equipped, \$1,635. This is 1913's most remarkable car value. Backed by a reputation of 30 years, it will win you from the first inspection. We have a most liberal proposition for good, live agents. Send for catalog today.

Ames Motor Car Co., Owensboro, Ky.

LAUTH-JUERGENS

**One, Two, Three and
=Five Ton Trucks=**

"Guaranteed for Life"

"Guaranteed Service"

**The Lauth-Juergens Motor
Car Company, Fremont, Ohio**

United States Tires

are good tires

They cut down tire bills

THE MASTER CAR **FIAT** 15th YEAR

6 Cyl. 50 H. P. \$5000
4 Cyl. 55 H. P. \$4500
4 Cyl. 35 H. P. \$4000

F. I. A. T.
POUGHKEEPSIE NEW YORK

UNIVERSAL JOINTS

"SPICER" MEANS QUALITY


"SPICER" on universal joints means quality, and "SPICER" quality has been a standard ever since universal joints have been manufactured.

Let us quote you prices on your requirements.

SPICER MFG. CO., Plainfield, N. J.

DOMESTIC REPRESENTATIVES: K. Franklin Peterson, 123 So. Michigan Blvd., Chicago; Theo. J. Wetzel, 17 West 42nd St., New York; L. D. Bolton, 1810 Ford Bldg., Detroit.

Foreign Representative: Benjamin Whitaker, 21 State St., New York.



To build up and increase future business, you should sell a truck that is


Durable, Economical, Neat in Design
and will satisfy your customer.

The performance of our truck will bring you easy sales. It is only a matter to put one in service and you will not worry about competition.

A card will bring you details

TRABOLD TRUCK MFG. CO., Johnstown, Pa.

GRAY & DAVIS LIGHTING DYNAMO SYSTEM



NOTE: COMPACT CONSTRUCTION OF DYNAMO AND LAMP CONNECTIONS.

Lights your lamps (without battery connection), charges your batteries, operates power-horn, inspection lamp, etc. A complete system—not a makeshift.

Gray & Davis Products

Are supplying oil and gas lamps wherever automobiles are used. Gray & Davis 6 Volt Electric Starter, Electric Lamps and Dynamo are Standard Equipment on America's leading cars.

GRAY & DAVIS, Inc., 55 Lansdowne St., Boston, Mass.
Manufacturers of Automobile Lamps, Dynamos and Electric Starters

BOYCE MOTOMETER
PAT'S PEND'G

Overheated Motors Support the Repair Man!



(Front View)

Know the temperature of your cooling system! Read it right from the seats while you drive. Excessive heat indicates trouble. When the Motometer says "Stop!" obey and investigate. It will eliminate repair bills.



(View from Seat)

THE MOTOMETER CO., Inc.
1788 Broadway, N. Y.
Chicago Branch, 1322 Michigan Ave.

Diamond SAFETY TREAD (Squegee) TIRES

Won't Slip - Won't Slide
Won't Skid - They Grip!



THE DIAMOND RUBBER CO. OF N. Y.
Subsidiary of The B. F. Goodrich Co.
Akron, Ohio

Ames Automatic Shock Absorber
ACTS ONLY ON THE RECOIL



Prevents broken springs due to recoil. Eliminates vibration. A logical device giving real efficiency.

CLARENCE N. PEACOCK & CO.
1784 Broadway Exclusive Licensees New York City

"Imperial Twelve" Garage Compressors



A high-class car equipment deserves high-class garage equipment. The quality of these little compressors is rich as to appeal to the most discriminating buyers.

Booklet 608

Ingersoll-Rand Company
New York Londo



EMPIRE
"The Little Aristocrat"

Model 31 108 Inch Wheel Base

The Completely Equipped Empire five-passenger touring car for \$950—Equipment includes Demountable Rims, Oil Sight Feed, Dash Air Adjustment, Mobair Top and envelope, Windshield, Prest-O-Lite tank, Speedometer and Eisemann Magneto

EMPIRE AUTOMOBILE COMPANY
Indianapolis, U. S. A.

AJAX EXTRA HEAVY NON-SKID TIRES

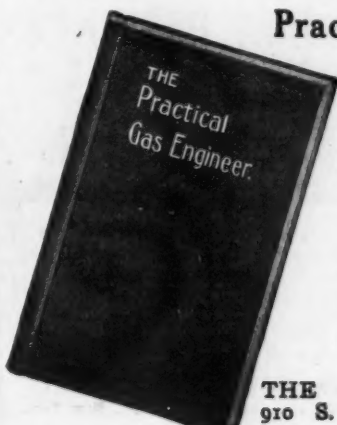
The Only 'Non-Skid' Tires
Guaranteed for 5000 Miles

AJAX-GRIEB RUBBER CO.

General Offices: 1796 Broadway, New York City
Factories: Trenton, N. J. Branches in Principal Cities

Practical Gas Engineer

By
E. W. LONGNECKER



Twelve years' constant experience with Hydro-Carbon Engines. How to start, how to operate, and how to care for all classes of explosive motors or engines using gas, gasoline or similar fuels. A full and exhaustive chapter on electric and other systems of igniting. Every line tells something. Every page full of interest. A book of 172 pages, neatly bound in cloth. Sent postpaid on receipt of price, \$1.00.

THE CLASS JOURNAL CO.
910 S. Michigan Ave., Chicago

FINISHED CRANK SHAFTS COMPLETE CONNECTING RODS COLD DRAWN STEEL SHAFTING

Screw Stock, Flats, Squares,
Hexagons and Special Shapes

FINISHED MACHINE KEYS - MACHINE RACK

All material finished to a
superior degree of accuracy

STANDARD GAUGE STEEL CO.
BEAVER FALLS, PA.

Any Kind
Every Kind
Stock, or
to Blue Print

Rims

Clincher
Q. D.
Demountable
Channels

For Automobiles, Motor Trucks
Aeroplanes, Motorcycles, Bicycles

We Also Make Axles and Hubs.

MOTT WHEEL WORKS, Utica, N. Y.

R. B. ABBOTT SALES CO., Sales Agents, Detroit

KLINE CAR

**"FIFTY"
\$2585**

A Light Six with ample, but not extravagant power, in five body styles, with separate electric starting and lighting and separate ignition systems, and four speeds forward.

Address Department A for Catalog

KLINE MOTOR CAR CORPORATION
RICHMOND, VA YORK, PA.
MAIN OFFICE AND FACTORY, RICHMOND, VIRGINIA

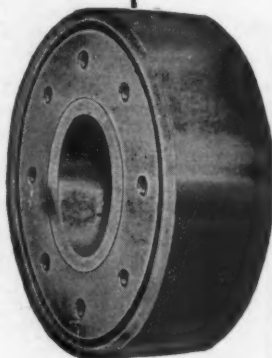
The Kinsey Manufacturing Company, Toledo, Ohio

MANUFACTURERS OF AUTO PARTS

KINWOOD RADIATORS, FENDERS,
KINWOOD OILERS, GASKETS,
KINWOOD STEEL FRAMES,
ETC., ETC.

SPECIAL METAL STAMPINGS

**"Hyatt
Quiet
Bearings"**



Hyatt Roller Bearing Co.
Detroit, Mich.

AUBURN 1913

"Rides Like a Pullman—Pulls Like a Locomotive"

38 Years' Manufacturing Experience
Built Into Every Model.

Model 33M—Two Passenger
Roadster; 33 H.P. long stroke
motor $3\frac{1}{2} \times 5\frac{1}{4}$ —Price, \$1150.

Model 33L—Five Passenger
Touring Car; 33 H.P. long
stroke motor $3\frac{1}{2} \times 5\frac{1}{4}$ —Price,
\$1150.

Model 40 A—Two Passenger
Roadster; 40 H.P. long stroke
motor $4\frac{1}{2} \times 5$ —Price, \$1650.

Model Six—50—Six-Cylinder Touring Car, 50 H.P.
long stroke motor $4\frac{1}{2} \times 5\frac{1}{4}$ —Price, \$3000.

Model 40 L—Five Passenger
Touring Car; 40 H.P. long
stroke motor $4\frac{1}{2} \times 5$ —Price,
\$1650.

Model Six—45 B—Two Passen-
ger Roadster, 45 H. P. long
stroke motor $3\frac{1}{2} \times 5\frac{1}{4}$ —Price,
\$2000.

Model Six—45—Five Passenger
Touring Car, 45 H.P. long
stroke motor $3\frac{1}{2} \times 5\frac{1}{4}$ —Price,
\$2000.

Send for 1913 Catalog

AUBURN AUTOMOBILE COMPANY, Auburn, Ind.

BOYER SUSPENSION BEARINGS

Perfectly combine the functions of
both thrust and radial bearings

**"Transmit Most Power Because They Have
Least Friction"**

Users of Thrust Bearings will be interested in
knowing that all of our Anti-Friction Bearings
receive our own special grinding and heat treat-
ment.

These costly processes ensure absolute trueness
and exact density of steel with entire freedom
from magnetic influences.

Write today for our catalog

The Suspension Roller Bearing Co.
SANDUSKY, OHIO

WHERE'S YOUR "SIX" FOR 1913?

Every progressive manufacturer announces a "Six" for 1913. The supremacy of the "Six" is established. It has come to stay. Sooner or later you have got to add a "Six" to your line. Competition will force you to it. Why not now? Your 1913 "Six" at from \$1600 to \$2,000 will prove a self-seller if equipped with a

Beaver "Six" Unit Power Plant

With cylinders $3\frac{1}{2} \times 5$ inches this motor has the much
desired long stroke and just the right power—40-45 H.P.
Valves are extra large, and the enclosed valve action is
noiseless. Transmission unit enclosed with motor has
plate clutch and 3-speed forward selective sliding gear-
set. Write for catalog of motors and prices.

BEAVER MFG. COMPANY

2800 First Avenue,

MILWAUKEE, WIS.

Schacht

THE CAR THAT CAPTURED FIFTH PLACE AT INDIANAPOLIS, MAY 30TH

Here is Model "TS"—Electric Starter, Electric head lights, side lights and tail lamp operated with generator and storage battery, 36 x 4 demountable rims with one extra rim, folding zig-zag wind shield, trip speedometer, aluminum adjustable ventilator in windshield base, robe rail, foot rail, tire iron, horn, pump, all tools, jack and tire repair outfit. Price \$1850. Send for dealers' proposition.

\$1850

THE SCHACHT MOTOR CAR COMPANY
2931 Spring Grove Avenue
CINCINNATI, OHIO




THE THOROUGHbred CAR

**Electric Self-cranking, Electrically Lighted
Four Forward Speeds**

"Six Thirty-six" Touring Car and Roadster, \$1850
Model 30 Touring Car...\$1350 Model 30 Roadster...\$1250

LIVE WIRE DEALERS
WRITE FOR UNALLOTTED TERRITORY

HERRESHOFF MOTOR CAR COMPANY
Detroit, Michigan, U. S. A.

The Prestige accorded to

NEWTONE MOTOR HORNS

is directly due to its efficiency in warning and economy in operation



Torpedo Type
Price \$20

**Automobile Supply
Mfg. Co.**

220 Taaffe Place, Brooklyn, N. Y.

LIGHT OR WATER

We supply you with the one and save you the other. Ham's Truck and Pleasure Car Lamps are America's very best.



"Ideal" Washer with sponge attached.

Our "Ideal" Carriage Washers and Automatic Water Savers save the water.

Ask Us About Them

C. T. HAM MFG. COMPANY
Rochester, N. Y.

"Pass Them All"



Motor Cars

Send for Pleasure or Commercial Catalogues.

KNOX AUTO CO., SPRINGFIELD, MASS.

AIREASE

Ends Tire Troubles

Touring time is coming soon. Don't let it be spoiled by constant tire trouble, worry and expense. If the tires on your car were as good as the rest of the mechanism, motoring would be an ideal pleasure. You can make it so by filling your tires with AIREASE, the indestructi-

ble, unpuncturable and resilient tire filler. Does not injure the rubber, never loses its easy-riding qualities, cannot dry out or pulverize.

A new set of inner tubes and money refunded if you do not get satisfactory results from AIREASE.

Refer all inquiries for Michigan to
HARLAN S. SMITH & CO., PONTIAC, MICH.

For Florida to
THE FLORIDA AIREASE CO., JACKSONVILLE, FLA.
AIREASE TIRE FILLER COMPANY
Cor. 14th St. & Pennsylvania Ave., Washington, D. C.

Liquid Graphite

It is known as Oildag. As an automobile lubricant it increases power, reduces the oil consumption and prevents carbon, spark plug and valve troubles.



Ask us to send Booklet 458-P

**INTERNATIONAL
ACHESON GRAPHITE CO.,**
Niagara Falls, N. Y.

Gen. Agts. for Oildag, made by
Acheson Oildag Co.

Perfection Spring Co.

MANUFACTURERS

High Grade Automobile Springs



Central Ave., Cor. E. 65th St., Cleveland, O.

AUTO-TOP FABRICS OF EVERY DESCRIPTION

SAMPLES AND PRICES ON REQUEST

L. J. MUTTY CO., Boston

Automobile, Motorcycle and Bicycle Supplies

Ask for catalog "M"
Dealers only

THE BECKLEY-RALSTON CO.,
Mich. Ave. & Randolph St., Chicago

SPROCKETS



**Chains and
Differential**

In Stock or Order
Send for New Catalog

CULLMAN WHEEL CO.
1241 Greenwood Terrace, Chicago

North East Electric Co.

ROCHESTER, N. Y.



**Combination
Electric Starting
and Lighting Systems**

PATHFINDER

AMERICA'S GREATEST ENDURANCE CAR
Write for Our "101 Reasons"—Something Different

MOTOR CAR MFG. CO., Indianapolis, U. S. A.

"VULCAN" SPRINGS—THE GOOD KIND

Figures show that VULCAN Springs last longer than the ordinary kind. Facts prove that they ride easier.

Stock on Hand to Fit:

Ford	Maxwell	Hudson
Overland	E. M. F.	Chalmers
Buick	Flanders	Oakland
Reo	Hupp	R. C. H.
Cadillac	Regal	Everett



JENKINS MFG. COMPANY, 118 N. THIRD ST., ST. LOUIS, MO.

KRUPP AUTOMOBILE CRANK SHAFTS, STEEL FORGINGS AND FRAME MEMBERS, GEAR BLANKS, KRUPP BAR STEEL BALL MILLS, TUBE MILLS AND OTHER MACHINERY

USE KRUPP STEEL

CALL FOR KRUPP STEEL
IN YOUR CAR AND
SEE THAT YOU GET IT

THOMAS PROSSER & SON, 28 Platt Street, NEW YORK

KRUPP STEEL LOCOMOTIVE TIRES AND CAR WHEEL TIRES, CRANK SHAFTS, STEEL FORGINGS AND CASTINGS, STEEL TIRED CAR WHEELS, PROSSER BOILER TUBE EXPANDER

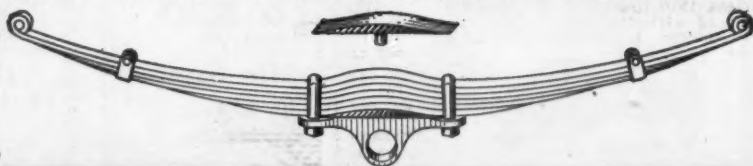
DO YOU WANT SPRINGS THAT WILL NOT BREAK?

Cut shows **Titanic Springs**

which have no hole to break at. If broken at center will replace and no questions asked. For any car.

We make also every pattern of AUTOMOBILE SPRINGS

TUTHILL SPRING COMPANY, 762 Polk St., Chicago



FEDERAL TIRES

"EXTRA SERVICE"

Federal Rubber Manufacturing Co. Milwaukee

RHINELAND BALL BEARINGS

"INSURANCE FOR BUILDER AND USER"

RHINELAND MACHINE WORKS CO.—142 WEST 42ND ST. NEW YORK

Read Motor Age



CONTINENTAL SIX CYLINDER—UNIT POWER PLANT THREE POINT SUSPENSION

The Continental "Six" is maintaining, on the road at this minute, the good name made by our Four Cylinder types. Built to accommodate any type of self-starter now made. Suitable for right or left hand drive. Write for booklets.

Showing simple and efficient chain drive for starting motor.

4 and 6 cylinders, 40 to 70 H. P.

CONTINENTAL MOTOR MFG. CO. DETROIT MICHIGAN
Factory Representative
K. F. PETERSON
123 Michigan Blvd., Chicago, Ill.



Windshields of Character

About half of the representative cars of the United States are equipped with Troy Windshields. Write for literature.

TROY CARRIAGE SUN SHADE COMPANY
Dept. C, Troy, Ohio

Ten Eyck Pump Only Automatic Air Pump

For Tires or Tank
Gear or Friction Drive
Send for illustrated booklet

541 Tremont Street, BOSTON, MASS.

Coils, Magnetos, Timers, Spark Plugs

Catalogue on Request

SALES OFFICE, DETROIT, MICHIGAN

HEINZE ELECTRIC COMPANY

Lowell, Mass.

The PARISH & BINGHAM CO.
PRESSED STEEL

FRAMES

Write For Estimates
CLEVELAND OHIO

CLASSIFIED ADVERTISEMENTS

The Trading Center
of the
Motor Car Industry

MOTOR AGE

Rates—20¢ per line
6 words to a line

Cars For Sale

A FINE 1910 THOMAS FLYER; 70 H. P., fully equipped, A-1 condition. Also 50 H. P. Welch car, fully equipped, A-1 condition. Big bargain on either car. Address Box D 307, c/o Motor Age. w

A SNAP—MY WAVERLY ELECTRIC, 1910 model, never been used, with genuine leather top and side curtains. \$350.00. Address A. D. Muller, c/o Hotel Dayton, St. Paul, Minn.

A 7 PASSENGER, 40 HORSE POWER White Steamer and one 20 h. p. 4 pass. Both machines like new. Joy valve engines, kerosene burners operating for one-half cent per mile. Address Box D 151, c/o Motor Age. w

BARGAINS! BARGAINS! BARGAINS!

Stoddard-Dayton 50 raceabout 1909... 475.00
Pope Hartford 1909, fore-door, 7 pass... 600.00
Pope Hartford 1911, 50 h. p., fore-door... 1,150.00
Berliet Alco 70 h. p. raceabout... 575.00
Amplex five passenger touring... 700.00
Peerless 1910 touring, fully equipped... 900.00
Pierce 30 with 1912 fore-door body... 750.00
Packard 1908, late improvement, fully equipped... 850.00
Flat 40, fore-door, double chain... 800.00
Itala 30 h. p. touring, seven passenger. 750.00
250 tops, Mohair and Pantasote, from \$10 to \$35, all new, for every make car.

Also motors, transmissions and different parts for all makes of cars at 50% off the list price.

Bodies, new and used, touring and runabouts, wrecking prices.

PACIFIC MOTOR CAR EXCHANGE CO., 10 West 62nd St., New York.

CHALMERS SPEEDSTER, COMPLETELY reconstructed and repainted. It is as good as new. Has 33x4 new Firestone tires. Capable of speed of 65 miles per hour. Will sacrifice to get cash quickly. Full information and photograph upon request. Address E. S. Youse Co., Reading, Pa.

ELMORE TOURING CAR, LATE 1912 model, used 1,800 miles; top, speedometer, and full equipment; price, \$700; warranted perfect condition; fine roadster. H. J. Daniels, Norwich, N. Y.

FAL CARS AND REPAIRS

F. A. L. Auto Co., 4052 Princeton Ave., Chicago. Phone Drover 1712.

FOR SALE CHEAP

1—Sevens Duryea, 6-cylinder, 2-passenger touring car.
1—Thomas 6-70, 7-passenger touring car.
1—Hudson "33" 5-passenger touring car.
1—Mercer 4-passenger pony tonneau.
1—EMF Thirty 4-passenger car.
1—Waverly electric 4-passenger.
All in good condition. Address, Lucia Bros. Motor Car Co., Green Bay, Wis.

FOR SALE—WHITE STEAM CARS, VARIOUS models, in excellent condition; also parts for steamer engines and generators. We specialize in steamers. Joseph Libal, 3145-53 N. Halsted St., Chicago.

FOR SALE—FLANDERS 1912 DELIVERY car in good condition. Address Roesling Bros., Janesville, Wis.

FOR SALE—MUST HAVE THE CASH quick; one 7-Pass. Glide, fully equipped, all first-class tires as good as new; new cylinders and gears throughout; will make good undertaker's wagon or high-power racer; worth \$1,000.00; my price for quick money, \$500.00. Come and see the car and examine it; will demonstrate to your satisfaction. W. E. Morrison, Lafayette, Ind.

FOR SALE—3-TON AVERY TRUCK; GOOD condition; been run, altogether, about six months; paid \$3,200; will sell for \$1,500. Bowman Bros. Transfer, Decatur, Ill.

FOR SALE—4 PASSENGER, MODEL 10, Buick; \$350. Nelson Mfg. & Supply Co., Hutchinson, Kans.

FOR IMMEDIATE DISPOSAL—1 SLIGHTLY used, 3-passenger, Stoddard-Dayton; coupe and full equipment. A fine looking car and as good as it looks. A good buy at \$900.00.

Downer Place Garage Co., Aurora, Ill.

MITCHELLS REBUILT, GUARANTEED.

These cars are fully equipped. Call or write for further particulars.

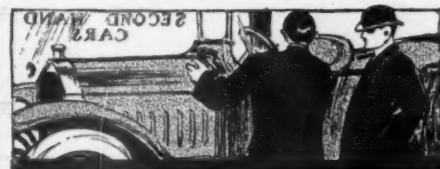
Mitchell Automobile Co., 2334-36-38 Michigan Ave., Chicago.

NEW CARS AT THE PRICE OF OLD

We have made arrangements with some of the leading factories to handle their slightly used and rebuilt cars. Manufacturer's guarantee back of all cars sold by us. A chance in a lifetime for real bargains.

Write stating size car wanted, and let us send you list of cars on hand.

THE REBUILT CAR CO., Indianapolis, Ind. Box 9.



Second-Hand Cars

6 insertions in MOTOR AGE classified columns resulted in clearing one dealer's sales floor of second-hand cars.

6 insertions cost him \$10.26. The cars sold for \$5,200.

ONE 16 AND ONE 20-PASS. AUTO BUSES. Have been run only a short time. At a bargain.

Beck & Son, Cedar Rapids, Iowa.

PANEL BODY, LIGHT DELIVERY, 4-CYL., 40 h. p. wagon in first-class mechanical condition. Will sacrifice at \$250 if taken at once. The White Co., 2635 Wabash Ave., Chicago, Ill.

PREMIER

Rebuilt cars like new. Must sell quickly to make room for new Models.

1912 King. 1910 Winton.
1912 R. C. H. 1909 Peerless.

Will make special price to move these cars. The Quality Car Co., 2329 Michigan Ave., Chicago. Cal. 4501.

1911 KISSEL COUPE, ELECTRIC LIGHTED, in first-class mechanical condition. Will sacrifice if taken at once. The White Co., 2635 Wabash Ave., Chicago, Ill.

1910, 7-PASS. FORE-DOOR OLDSMOBILE in first-class mechanical condition, fully equipped. Will sacrifice if taken at once. The White Co., 2635 Wabash Ave., Chicago.

WELCH PONTIAC; 4 CYL., 50 H. P., 7 passenger; new body, top and paint; full equipment; first-class condition; a bargain. Albert Schrieber, 3916 Washington Ave., St. Louis, Mo.

RANDOLPH LIGHT TRUCK, SUITABLE for light delivery work with solid tires, \$200. The White Co., 2635 Wabash Ave., Chicago, Ill.

1908 PACKARD 30; RUN 6,000 MILES; EXCELLENT condition; fully equipped. Address Box D 318, c/o Motor Age. t

1912 MARMON SPEEDSTER, INDIANAPOLIS speedway type car, in A1 condition, run about 4,000 miles. For particulars, apply to W. F. Burroughs, 66 Midland Ave., Arlington, N. J. Tel. 29 Arlington.

1912 STEARNS-KNIGHT, 5-PASSENGER four cylinder, selfstarter, and full equipment, including seat covers. Can be purchased at a bargain. G. L. Mannus, 1717 McGee St., Kansas City, Mo. h

7-PASS. STEARNS, WITH ONE 7-PASS. body and one 5-pass. body, fully equipped. We will let this 50 H. P. car go at \$650. The White Co., 2635 Wabash Ave., Chicago, Ill.

Cars Wanted

FINE QUARTER SECTION LAND IN HETTERER Co., N. D., for sale; will take auto in part payment; what have you for exchange. Address, Burt Walker, Lancaster, Wis.

MY KINGDOM FOR A CAR

160 Acres fine Oklahoma land; level; soil, black loam; all fenced; house; at \$20.00 per acre, worth more, but I want a car; what have you in exchange?

A. L. Stone, Texline, Tex.

WANTED—LATE MODEL T FORD TOURING Car for cash. Give lowest cash price in first letter. Blank & Six, Ashland, Ill.

WANTED—SECOND-HAND AUTO IN EXCHANGE for stock of talking machines, etc. Address H. S. Sanborn, Middleport, O.

WANTED—1912 AUTO IN EXCHANGE for 160 acres good Minnesota land. Address Box 414, Marshalltown, Iowa. k

Parts and Accessories FOR SALE

A BARGAIN IN NEW EQUIPMENT.

Think of it. A Combination of a new set of Jiffy curtains, a new set of Seat Covers, your choice of either the Vesta Electric or Start-Lite Gas System for lighting your lamps, and a McGregor Bumper at a great reduction.

We are specializing this combination for Ford cars, but equipment for other cars can be had at a saving that will vitally interest you.

Full particulars and prices will be mailed you on receipt of your letter.

Don't put this matter off; write at once to

R. B. Lacey & Co., General Sales Agent, Trumbly Auto Top and Equipment Co., 1467-69 Michigan Ave., Telephone Calumet 1070 Chicago.

A BATTERY BARGAIN—6-80 STORAGE batteries, Exide, Vesta, National, Universal, for auto lighting and lighting, \$1.50 to \$7.50. 4105 Cottage Grove Ave., Chicago. a

A BUELL WHISTLE WILL PRODUCE more noise than any other horn. Screws into cylinder like spark plug. Blown by 250 lbs. pressure. Send for circular. 3-chime, \$7.50. Sells on sight. Agencies wanted. Buell Auto Co., 6053 Cottage Grove Ave., Chicago.

A COMPLETE STOCK OF ONE AND TWO
Cylinder Reo Parts, which we offer at a discount of 40% from factory list on business amounting to \$20.00 or more. Address Box D 279, c/o Motor Age. J

ATTENTION—FORD OWNERS
HERE IS SOMETHING NEW.
Front and rear number plate holders for Ford cars. Put on in two minutes. Complete, ready to install. Sent by mail. Per set, front, 25c; per set, rear, 25c. State year of car.
Vautrot Bros., Durand, Wis.

ATTENTION—HENRY OWNERS
Having purchased the repair business of the Henry Motor Co., we are prepared to fill orders promptly for repairs for Henry cars. Muskegon Automobile Co., Muskegon, Mich.

AVOID ACCIDENTS—DIM-A-LIGHT THE
new device for controlling the glare of electric headlamps. Pellets Magneto Exchange, 1463 Michigan Ave., Chicago, Ill.

A WHITE STEAMER GENERATOR AND
burner, almost new. Will sell cheap. Address Box D 245, c/o Motor Age. w

AUTOMOBILE BODIES, PLEASURE AND
Commercial.
Foredoors for open-front cars. Write for prices.
Auto Specialty Mfg. Co., 326 E. Market St., Indianapolis, Ind.

BALL & ROLLER BEARINGS, ALL TYPES.
Distributors of
"F & S" Ball Bearings.
"New Departure" Ball Bearings.
"Pressed Steel" Ball Bearings.
"Standard" Ball and Roller Bearings.
BALL BEARINGS REPAIRED.
THE GWILLIAM COMPANY,
New York—Broadway, at 58th St.
Philadelphia—1314 Arch St.

BEAUTIFUL LIMOUSINE BODY, LUXURI-
ous leather cushions, electric lights, speaking tubes; looks like new. Bishop Furniture Co., Grand Rapids, Mich.

BLOOM OUT IN THE SPRING
with silver plated trimmings. AR-GEN-TOR, the only reliable compound; will plate them all in a few moments. You do it yourself at home. Deposits a permanent plate. There is no other like it, none just as good. Remember, please, that it contains no mercury or cyanide. Readily plates on brass, copper, steel, etc.
Thousands have used it and success is assured. We guarantee it. Full size, \$1.00, prepaid.

Forest City Sales Co.,

Fremont, Nebr.

BRAND NEW 6 CYL. U. & H. HIGH TEN-
sion magnetos complete with terminals, \$35; brand new 1 cyl. U. & H. high tension magnetos, \$15; Warner steering gears, brand new, complete with spark and throttle levers, \$14; new double bucket seats with cushions, \$20. Send for Bulletin No. 12.

AUTOMOBILE APPLIANCE CO.,
1712 Michigan Ave., Chicago, Ill.

BRAND NEW 35-40 H. P. FOUR CYLIN-
der motors, with fan, pump, clutch, magneto and coil. Price \$222.50. Not old, discontinued models, but up-to-date in every way. F. E. Alford, Goshen, Ind.

DETROIT FORE-DOORS

for

E-M-F. Ford and Hudson.
One piece aluminum; immediate shipment subject to inspection.
Detroit Fore-Door Co.

564 Porter St., Detroit, Mich.

DISCO SELF-STARTERS

For Sale. Only a few. Equip your car with a self-starter for this winter. Guaranteed new stock. List price, \$50; our price, \$12.50. Parsons Sales Co., 1817 Grand, Kansas City, Mo.

BUY A SELF-STARTER.

E. Z. Self-Starters, complete, less gas tank Each \$ 5.00
Four-cylinder new motors Each 80.00
Sliding gear transmission with clutch 47.00
34x4 demountable wheels with Q. D. clincher rims per set of four 20.00
Model T Ford radiators 16.00
Model 10 Buick 22.00
Model F Buick 25.00
Fuller radiators 20.00
Jackson 22.00
Reliable-Dayton 6.50
Krit 15.00
Van 17.00
Olds Cellular 25.00
F-A-L 25.00
Demot 12.00
Send for our Bargain Sheet of other radiators, fenders, tires and supplies. Our prices beat any quoted in the United States.
Auto Parts Co.,
513-31 Jackson Blvd.,
Chicago.

COMBINATION IGNITION LOCKS

STOP THE AUTO THIEF.

Your car cannot be stolen if equipped with a Combination Ignition Lock. Chicago auto thieves stole \$2,600,000 worth of automobiles last year.

PROTECT YOUR CAR With a Combination Ignition Lock.

Inexpensive; easily applied to any car; convenient; simple; no keys; works like the dial on a safe; far cheaper and better than insurance, which does not repair your car even though recovered.

Details and catalog on request.

The Auto Combination Lock Co.,
1467 Michigan Ave.,
Chicago.

CUT-OUTS

E.M.F., Flanders, Buick, Regal, etc. Complete outfit with brass lock, open pedal, \$1.50. Lincoln Machine Shop, Lincoln, Ill. c

DRAGON REPAIR PARTS.

We manufacture and keep on hand all repair parts for the Dragon cars. We make a specialty of repairing this machine. Philadelphia Machine Works, 67 Laurel St., Philadelphia, Pa.

ELECTRIC HORNS COMPLETE \$3.00;
vulcanizers complete 90 cents. The new catalogue ready March 15. Fred Allen Auto Supply Co., 1610 Michigan Ave., Chicago, Ill.

ELECTRIC LIGHTING EQUIPMENT.

We can furnish a complete system for \$36. This outfit consists of one 6-volt, 140-ampere battery, two head lights, two side lights, one tail light, wire for car switch and bulbs. Head lights are 10-inch solid brass with silver plated parabola reflectors, and side lights are 6-inch same material. The Ampvo Battery Co., 1607 Michigan Ave., Chicago, Ill.

E. M. F. PUSH ROD ADJUSTERS

\$1.50 for complete set delivered. Money back guarantee. Auto Parts Co., Providence, R. I.

FORD AGENTS—WE MAKE A SPECIALTY
of Dust Hoods to cover top when clashed down, for Model T Ford 1910-1911-1912-1913 cars. Write for prices. Will save you money. The H. A. Hawes Storm Front Co., Coldwater, Mich.

FORD FAN BELTS, WOVEN COTTON AND
silk outlast six regular belts. Postpaid, 75c. Dealers, write. Angier's, Streator, Ill.

FORD OWNERS

A postal brings you our 1912 catalog of 22 necessities for your car. Auto Parts Co., Providence, R. I.

FORD OWNERS AND DEALERS!

You will save trouble and money by installing our timer elevating device.
Ford Parts Specialty Co.,
1211 Main St., Richmond, Ind.

FORD LIGHTING OUTFIT \$5.50
Includes parabolic reflectors, tungsten bulbs, wiring, switch and free delivery. Truscott Auto Supply Co., St. Joseph, Mich.

FORD, HUPP AND MAXWELL
Muffler cut-out machined ready to attach, including lock, open pedal string and cables, \$1.35. Lincoln Machine Shop, Lincoln, Ill. c

FORD OWNERS—WE CAN IMPROVE THE
appearance of your Ford car 25% by adding to the top of the doors a set of mahogany moulding, stained to match the dash, at a very small cost to you. Write today for particulars. The Specialty Co., 2220 Calumet Ave., Chicago.

FORD OWNERS—YOU CAN INCREASE
the life of your tires 25% by fitting your car with Wire Wheels. Will also improve riding qualities of your car and make it up-to-date. Write Racine Auto Parts Co., Box 86, Racine Jct., Wis.

FORD OWNERS WANTING FIVE ELEC-
tric lights using Ford magneto for charging a storage battery (self contained system), write American Battery Co., 1124 Fulton St., Chicago. g

FORD OWNERS—OUR SPARE DEMOUNT-
able wheel cures tire trouble on road. Doctors attention. Write Angier's, Streator, Ill.

FORD T OWNERS
Foot throttle or accelerators, \$1.50. Lincoln Machine Shop, Lincoln, Ill.

FORE DOORS

Doors made for all makes of cars. Guaranteed prompt shipment and a very good fit. We have patterns for most every car. F. E. Lortz Co., 2503 E. 55th St., Cleveland, Ohio.

FORE-DOORS.

Bring your open-front car up-to-date. We make fore-doors to fit all standard makes of automobiles. We carry large stock and guarantee prompt shipments.
Write for prices and description.

Pioneer Fore-Door Mfg. Co.,

211-217 W. Georgia St. Indianapolis, Ind.

FOR SALE—BRASS AND BRONZE AUTO-
mobile monograms; original and artistic combinations of letters; any size up to nine inches high; regular \$12.00 value for only \$5.00. George W. Unger, Columbus, Ind.

FOR SALE—NO. 2 WILLIAMS VULCAN-
izing Kettle, in first-class condition. C. L. Post, No. 86 Gay St., Stamford, Conn.

FOR SALE—OWING TO CHANGE IN
model, 100 new frames, 128" wheelbase, extra heavy. G. J. Schaefer, 439 63rd Street, Brooklyn, N. Y. p

FOR SALE—THREE BOWSER PORTABLE
gasoline garage tanks, complete, in good condition. B. C. Hamilton & Co., 1218 Michigan Ave., Chicago.

FOR SALE

Large sight seeing body for sale. Quick action necessary.

F. E. LORTZ COMPANY,
2503 East Fifty-fifth st., Cleveland, Ohio.

FOR SALE—ONE LIMOUSINE BODY FOR
Stearns 30-60 chassis. Body cost \$1,750 when new; used one season and in perfect condition. Price, \$800 f. o. b. Louisville. Louisville Lozier Company
Louisville, Ky.

FOR SALE—1 MARBLE HAYWOOD
Model E Vulcanizer for casings and tubes 2½ to 5 in., cost \$115 new 1 year ago. Will sell for \$60. Have no use for it. Guaranteed first-class shape. Address Box D 298, c/o Motor Age. w

FRAMES, 34 INCHES WIDE—

112 W. B. Straight, each.....\$12.00
Frames, 36 inches wide—112 W. B.
straight, each..... 14.00
Frames, 36 inches wide—124 W. B.
straight, each..... 15.00
Unassembled frames—Kickup 112-inch
W. B. 34 inches wide each..... 8.00
For assembling, each..... 4.00
Wheels—34x3½, 32x3½, per set—\$12.00- 10.00
Axles—40-50 H. P. rear, each.... 50.00- 60.00
Radiators, 30 H. P. honeycomb each... 15.00
Address Box D 169, care Motor Age.

FOUR WHEELS WITH SOLID TIRES, timken roller bearing axles, springs, steel frame, jack shaft with sprockets and chain, from 2-ton truck, in first-class condition, will be sold as a whole or separately. State your requirements.

Badger Motor Co.,
Milwaukee, Wis.

GUARANTEED.

Radiators for all cars.

The following is our stock list of radiators for the cars mentioned, subject to immediate shipment. Compare our prices with other lists:

Ford Model "T".....	\$18.00
Ford Model N-R-&-S.....	23.00
Buick 10-32-33-14.....	27.50
Buick F-16-17-19-26-27-28.....	35.00
Buick B-K-S-38-39.....	42.50
Hudson 20.....	33.00
Chalmers F-40.....	30.00
Lion 40.....	25.00
Warren 40.....	28.50
E. M. F. 30.....	30.00

Terms: One-third cash with order, balance C. O. D., or five per cent discount for cash with order.

Autoparts Manufacturing Co.,
Detroit, Michigan.

HUPP OWNERS.

Write for our parts list; save you 1/4 on repair parts.

Autoparts Mfg. Co.,
Cor. Trombley and Orleans,
Detroit, Mich.

KASTNER TIRE AND RIM CO.,

2112 Michigan Ave., Chicago.
Standard Universal, quick detachable rims in sizes 30x3, 34x3 1/2, 32x4 at \$5.00 a set of four, absolutely new. Also 30x3 one-piece clincher rims at 50 cents each. Send for cut of quick detachable rim and our new rims part catalogue.

KEROSENE FOR AUTOMOBILES

Our new Model B uses successfully half and half mixture lowest grades kerosene and gasoline. Satisfaction guaranteed or money refunded. Greatly increased power; very slow speed on high. Starts easy at zero. Special agents' prices. Dept B,
The Air-Friction Carburetor Co.,
Dayton, Ohio.

LATEST FORD TOURING CAR BODY, \$90.00. Latest Ford roadster body, \$35.00. Tops, curtains included. Box D 303, c/o Motor Age.

LIGHT—ARE YOU SATISFIED WITH your present light? Would you improve it if you knew how? Then send for a circular of our "White Light Gas Refiner." Barnard Brass Works, Rockford, Ill.

LIMOUSINE BODY — 7-SEATED; HAND- buffed leather cushions; complete; nearly new. Cincinnati Hide and Leather Co., Station B, Cincinnati, Ohio.

MACHINE SHOPS AND GARAGE—OUR WELD IT ALL machines will weld perfectly any broken casting that has a melting point. Full particulars on Oxy-Acetylene welding machines sent on receipt of your address. Every machine fully guaranteed. H. D. Prose & Co., Wichita, Kansas.

MAKE YOUR DOLLARS HAVE CENTS.

\$150.00 rear axles.....	\$45.50
50.00 windshields.....	10.00
Wheel.....	2.50
Transmission and clutch, cost \$200, sell 75.00	
Silk Mohair tops, complete, each.....	10.00

Send for real bargain list.
Puritan Machine Co.,
51 Tenth St., Detroit, Mich.

MAXWELL PUSH ROD ADJUSTERS

\$1.50 for complete set delivered. Money back guarantee. Auto Parts Co., Providence, R. I.

MORA REPAIR PARTS

We purchased the repair business of the Mora Company and have in stock repair parts for all models of Mora cars. Philadelphia Machine Works, 67 Laurel St., Philadelphia, Pa.

MOTORS FOR SALE CHEAP, 4 CYL. 40 and 6 cyl. 50, nearly new. Call or write Boulevard Motor Car Co., 266 27th St., Milwaukee, Wis.

MR. (FORD) OWNER AND GARAGE MAN

The Townsan Valve Adjuster has a cushion for your valve-stems. Takes away the click, absolutely silencing the valves. No screws or burrs to work loose. Saves putting in new push-rods and valve-stems. They never wear out. Price \$1.50 by mail. Ask your jobber, or address Townsan Auto Specialty Co., Mitchell, S. D.

NICKEL PLATE YOUR AUTO TRIMMINGS with Electro-Knickel. Prevents brass from tarnishing, iron from rusting. This is not a silver or mercury wash. We guarantee it plates (without a battery). Price \$1.00, express prepaid. Write for information. Gun Metal Finish Co., 313 Powers Block, Decatur, Ill.

ONE 4 CYL. 50 H. P. ENGINE.....\$ 50.00
Model B No. 5 Stromberg Carburetor..... 12.00
Model D 4 H. T. Bosch Magneto..... 40.00
Model D U 4 H. T. Bosch Magneto..... 35.00
Six 4 cyl. 4 cycle 45 H. P. Milwaukee Motors, each..... 125.00
Auto Salvage & Parts House,
1436 Wabash Ave.,
Chicago.



"Fast and Furious"

"MOTOR AGE inquiries are coming in fast and furious. From size of classified ad and time it has run we are most agreeably surprised." An accessory man wrote us that. Are you being swamped with orders?

OXY - ACETYLENE WELDING PLANTS.

The Admiral Welding Machine is the ideal welding device; large capacity; self-generating throughout; portable; complete in every detail; a perfect machine for all work, large or small. Send for our booklet "Welding" and full description. Price \$200 f. o. b. Kansas City. Admiral Mfg. Co., 715 Lydia Ave., Kansas City, Mo.

PEERLESS EXTRA FINE BLACK JAPAN.

For all metal, lamps, radiators, fenders, etc.; air dries in 10 or 12 hours with a high gloss finish; elastic, tough, durable; no primer; one coat covers solid; ask your dealer.

The Columbus Varnish Co. Columbus, O.

PENNANTS FOR AUTOMOBILES MADE in rights and lefts from any colored felts desired; size 12x30. Price \$1.00 per pair. Cash with order. Liberal discount to dealers. J. C. Orcutt Co., Inc., Lincoln, Neb.

PEERLESS FINE BLACK BAKING JAPAN.

For baking on all metals; no primer; one coat covering solid; bakes to a high gloss finish in 2 to 3 hours; can also bake to a semi-gloss and dull finish; ask your dealer. The Columbus Varnish Co. Columbus, O.

PUNCTURFIX SEALS PUNCTURES

automatically—fixes punctures while riding, without loss of air; increases mileage of tires and pleasure of riding 100%. Call and witness demonstration or write. Money making territory now open to hustlers. Chicago Motor Co., 1157 S. Wabash Ave., Chicago.

PRESTO SELF STARTERS—WE HAVE A few upon which snap price will be given. Algona Auto & Mch. Co., Algona, Ia.

PRICES THAT TALK.

Flanders "20" tops.....	\$13.50
Carburetors 1 1/4" (Mayer or Holley)....	3.50
Barnes Steering Gears.....	10.00
Splittorf magnetos and coil.....	20.00
Trunks (size 31x17x12).....	4.00
Side lamps (black and brass) per pair.....	3.50
E. M. F. springs (rear).....	2.50
Universal joints 1 1/2".....	5.00
16" ball bearing fans.....	2.25
12" ball bearing fans.....	1.50
Hyatt roller bearings (all sizes).....	1.50
Head-light brackets 7" span....a pair.....	.50

Write for our new bargain sheets.

Autoparts Mfg. Co.,
Detroit, Mich.

RADIATORS—NEW GUARANTEED GOODS

Ford, Model T.....	\$16
Buick Model 10.....	22
Buick Model F.....	23
Chalmers-Detroit.....	20
Everett.....	20
Stoddard-Dayton.....	25

And any other make required at equally low prices.

Times Square Automobile Co.,
1210-1212 Michigan Ave., Chicago.

REFINISH YOUR CAR YOURSELF.

Take advantage of a new imported preparation known as 3 B Automobile Refinisher and increase the value and looks of your car 100%.

With 1 Litre of 3 B Refinisher, 1/2 Litre Waterproof dressing, a piece of cheese cloth or chamols and a brush, you can work wonders with the appearance of your car. The preparation and results are guaranteed.

The refinishing preparation will be sent you prepaid on receipt of \$3.75. Money will be cheerfully refunded if you are not perfectly satisfied. Send your order now to

R. B. Lacey & Co.,
Distributors,
1467-69 Michigan Ave.,
Chicago.

REPAIR PARTS FOR ANY MAKE CAR AT less than factory prices. Chicago's original gas engine men. Alexander & Cox Co., Ogden and Western Aves., Chicago.

PEERLESS BACK & CUSHION DRESSING.

For leather seats and cushions; dries hard on clean leather; the color does not come off; renews the finish; ask your dealer.

The Columbus Varnish Co. Columbus, O.

REPAINT YOUR CAR YOURSELF—WITH

our materials and full instructions, you can repaint your car as well as a regular painter and save from \$25 to \$50, depending on its size. Previous experience unnecessary. Latest colors. Write today for full information and color cards. We also make Liquid Gun Metal, the National Brass Enamel, \$1 a can, express prepaid. The only articles of proven merit for lamps, radiators, etc. No polishing. Arsenal Varnish Co., Automobile Dept., Rock Island, Ill.

SCHUBLER MODEL "L" CARBURETORS, new, 1 1/4 or 1 1/2-inch, \$8.00 each. This factory overstock nearly gone. Order early. Kent Motor Car Co., Kenosha, Wis.

SEAT COVERS FOR ALL CARS—SPECIAL price on Fords. We clean old covers; make them look like new. Auto Cape Top Co., 2334 Michigan Ave., Chicago.

SOME NEW AND USED REPAIR PARTS for Model 10 Buick, 38 Overland and R. and T. Mitchell at one-half price. Ben Cloyd, McKinney, Texas.

TAKE THE RATTLE OUT OF YOUR CAR.

Make it quiet. Anti-Rattle used, as directed on all worn parts and loose connections, will do it. Send \$1.00 for package with full directions to Anti-Rattle Co., Wallingford, Conn.

STEVENS AUTO TIRE VALVE

Adopted by Ralph De Palma, winner of the Vanderbilt Cup at Milwaukee, 1912. Can be attached instantly without any expense to any inner tube stem on any car. Saves one-half the time and labor necessary to inflate tires by any other method. Easily adjusted. Warranted not to leak. 200,000 in use. Send \$1.00 for set of four. Try them 30 days and if not satisfactory money will be cheerfully refunded. Stevens Manufacturing & Supply Co., 504 Fisher Bldg., Chicago.

STOP, MECHANICS! SEND 50 CENTS FOR "Surprise" hand soap receipt; antiseptic; acts quick; leaves your hands smooth; can be made at small cost. A. G. Jung, 450 W. Main St., Madison, Wis.

TO DOUBLE LIFE OF AUTO TOPS
USE GLAZENE.

Prevents sun rot and leaks on tops and on seats. Costs \$1.00, delivered. Satisfaction guaranteed or money back.
The Glazene Co.,
1328 Jackson Blvd., Chicago.

TOPS BUILT, RECOVERED AND RE-
paired.
C. G. Meyer & Son, Tiffin, Ohio.

TOURING, ROADSTER, RACING BODIES.
Seats, special and stock sizes. Radiators, hoods, tanks and fenders for any car. Get our prices.
Auto Sheet Metal Works,
2228 Michigan Ave., Chicago.

WE ARE PROVING TO CUSTOMERS from Indianapolis to Pittsburgh that THE HARRIS OXY-ACETYLENE WELDING EQUIPMENT is far superior to any other in the world. Our experts are doing soft, strong, flexible, machinable welds in all metals at the price you are asked for hard, brittle experiments. Visit our plant or send us your next job, and be "shown." This ad and \$136 gets you a garage plant suitable for any welding. ALUMINUM WELDING CO., 1012 Walnut St., Cincinnati.

\$325.00 36 H. P. MOTORS, \$150.00.
4-cylinder, twin construction, aluminum crank case, 3 bearing crank shaft, 1-piece cam shaft. Completely equipped. Guaranteed 1 year. Full details on application.
Oakbrook Motor Mfg. Co.,
Reading, Pa.

Ball Bearings**BALL BEARINGS REGROUND.**
RIGHT NOW.

Give us a chance to demonstrate that bearings reground by the Ahlberg process are as serviceable as new ones. Three years of Test and Success stand back of us and our bona fide guarantee accompanies all work. We carry in stock at all times complete line of Annular, Thrust, Radax and Double-Row Bearings. Facilities enable us to make special size bearings to your specifications.

Write Now.
Ahlberg Bearing Co.,
2640 Michigan Ave., Chicago.
New York. Branches Detroit.

Parts and Accessories
WANTED

WANTED—A TWO OR TWO AND ONE-
quarter inch carburetor, Schebler preferred.
Guy B. Carroll, St. Ansgar, Iowa.

WANTED—TOURING BODY FOR FORD
car. State lowest price and condition.
James Lieber, Waco, Tex.

Auto Wearing Apparel

ATTENTION—HAVE A FEW MANUFACTURER'S samples, gentlemen's black broadcloth fur lined overcoats lined throughout with Australian mink. Large, genuine Persian lamb collars, sizes 36 to 48. Value, \$75; will sacrifice for \$35 each. Also several ladies' handsome long fur coats, satin lined, worth \$90, while they last, \$35; and a few large size fur robes, plush lined, \$15 each. All guaranteed new. Examine before buying. Send express charges. Will send on approval. Write or call, E. Roberts, Room 6, 160 West 119th St., New York.

ATTENTION AUTO OWNERS

A genuine English slip-on Auto Rain Coat. Guaranteed waterproof at \$6.00. You are buying direct from manufacturer. Send money order. Express prepaid. National Rubber Rain Coat Co., 310 E. State St., Rockford, Ill.

For Sale or Exchange

WILL EXCHANGE SECOND-HAND AUTO-
mobiles for motorcycles. Allen Motor Co.,
Norfolk, Va.

Situations Wanted

A LIVE, HUSTLING, UP-TO-DATE AMER-
ican seeks position with going automobile concern as service manager, in repair parts department at factory or at service station. Ten years with four America's leading builders, as chief inspector, experiment superintendent, service manager. Have salesmanship ability, handle men. Executive ability and greatest efficiency in maintenance and operation. At present manager of business in which my interest is being disposed of. Address Box D 310, c/o Motor Age.

AUTO TRUCK DESIGNER—12 YEARS'
practical and technical experience; producer; systematic; interchangeable work; at present employed, wishes to make new connection. Address, Box D 317, Motor Age.

**Get Together!**

The man out of a position and the factory out of a man get together to their mutual advantage through MOTOR AGE classified columns.

AMERICAN HIGH SCHOOL TEACHER,
spending year in Europe, desires position as chauffeur to tour Europe during summer of 1913. Speaks German and French. Expert driver. American and European references. For particulars address Box D 312, Motor Age, or directly to Manly C. Wareham, 10 Rue Victor Hugo, Croix, Nord, France.

A1 TIRE REPAIR MAN WITH GARAGE
experience, will be open for engagement about April 15, 1913. I am an expert tire vulcanizer and a reliable automobile mechanic. Address Box D 274, c/o Motor Age.

CHAUFFEUR WISHES POSITION—SIX
years' experience. Best of references. Total abstainer. Address Box D 286, c/o Motor Age.

EXPERIENCED GAS-TRACTION ENGIN-
eer and machinist wants position as gas-engine operator or as an auto-truck driver. Have worked in auto-repair shops and have driven some high powered cars and trucks. Am operating a 60 h. p. Hart Parr gas-tractor now on a big ranch. Furnish reference; married. Address Box D, 281, c/o Motor Age.

HIGH GRADE SALESMAN, NOW EM-
ployed, who is also a mechanical engineer and possesses excellent business ability, desires position where he will not have to travel ALL the time. Have a wide acquaintance in the automobile and auto parts industry. Am 34 years old and very energetic. Address Box D 296, c/o Motor Age.

PURCHASING AGENT OR ASSISTANT—
Three years' experience, of good habits, open for engagement March 1, 1913. Address Box D 270, c/o Motor Age.

POSITION AS DESIGNER AND DRAFTS-
man; ten years' experience in automobile business; thoroughly familiar with shop work and all kinds of drawings. Address Box D 290, c/o Motor Age.

SALES MANAGER.

Experienced business man with very wide trade acquaintance wishes to market output of truck factory on salary and commission basis. Box D 238, c/o Motor Age.

SITUATION WANTED—AS CHAUFFEUR
either commercial or touring; best of references and married. Address Box D 297, c/o Motor Age.

SITUATION WANTED—FOREMAN
painter, fifteen years' experience on automobiles, wishes to make change; experienced on high grade and cheap work; good executive. Address Box D 313, c/o Motor Age.

SITUATION WANTED—SUPERINTEND-
ent of finishing, experienced on production of bodies, upholstering, painting and final assembly, now employed, would like to make a change. Ten years with one company. Address Box D 302, c/o Motor Age.

WANTED—POSITION AS CHAUFFEUR
for automobile party going West or North for summer outing of one or two months. All references as to driving and mechanical ability. Address, Box D 314, Motor Age.

WANTED—POSITION AS FIELD AUTO
salesman in Michigan. Have thorough knowledge of both retail and wholesale methods; am considered to be a first-class, resourceful business producer; will guarantee to make good. Desire connection with first-class house where the services of a high-class man will be appreciated.
Address Box D 289, c/o Motor Age.

Help Wanted**AAA OPEN POSITIONS.**

17 Draftsmen, Detailers and Designers, \$900-\$2,500; Technical Advgt. Man, \$1,200-\$1,800; machinery; Tool Designer, \$1,200-\$1,500; Detailer and Stock Biller, \$1,200; Blacksmith Foreman, \$1,500-\$1,800; Metal Patternmakers, best wages; Sr. Accountant, \$2,000; Trav. Auditor, \$1,500; 14 Bkpr., \$780-\$1,500; Cost Acct., \$1,040-\$1,500; Corresp., \$1,040-\$1,200, engraving; District Mgr., \$5,000-\$6,000; packing house; 23 Stenogs, \$780-\$1,040.
Every position open, besides many more not listed. Write us immediately. Always glad to explain.

BUSINESS MEN'S CLEARING HOUSE,
323, 108 La Salle St., Chicago.

AUTOMOBILE SALESMAN WANTED FOR
city of 100,000; liberal commission proposition. Box D 300, c/o Motor Age.

FIRST-CLASS CHECKER, EXPERIENCED
in Commercial Truck work; state experience, age, salary, etc. Address
Studebaker Corporation (Engineering Dept.),
South Bend, Ind.

MECHANICAL ENGINEERS, SUPERIN-
tendents, works managers and designers wanted. The Engineering Agency, Inc.,
Monadnock Bldg., Chicago.

A LICENSED A. A. A. RACING DRIVER

wishes to sign up with private owner or factory for 1913 races. He has driven in road and track races with success. Address Box D 287, c/o Motor Age.

SALESMAN—AUTO ACCESSORY; ONLY
those having an established trade need reply; all communications confidential; state city or territory you are now covering to receive the best side-line; no samples to carry. Address Box D 315, c/o Motor Age.

SALESMAN—ONE WHO IS NOW VISITING
automobile trade or owners. Good money made on a very attractive proposition. Sturdy Mfg. Co., 2637 Michigan Av., Chicago.

WANTED—A FIRST CLASS SALESMAN
to take charge of the sales of gear plant. Product of proven merit. Opportunity also for investment. Good chance for the right party if competent. Address Box D 306, c/o Motor Age.

SALESMEN—TO REPRESENT US IN TERRITORY not now contracted to sell our Auto Combination Ignition Locks; inexpensive, convenient, simple, readily applied to any car. Excellent proposition for your entire time, but can be handled as side-line by salesmen calling on automobile trade and owners. Exclusive territory, terms, etc. Auto Combination Lock Co., 1467 Michigan Ave., Chicago.

WANTED—GOOD, RESPONSIBLE SALESMEN to act as our exclusive representatives in States not now contracted, to sell our new invention for automobiles, the "Automatic Speeder and Primer." Gives 25 to 50% more mileage on gasoline consumed, and does it "automatically." One demonstration of this invention satisfies the most skeptical. Prefer men with car. Write: Automatic Device Co., Frankfort, Ind.

WANTED—POSITION IN PRIVATE FAMILY as chauffeur; 3 years' experience; best reference. Name car. E. E. Travers, 1818 15th St., N. W., Washington, D. C.

Radiator and Lamp Repairing

A-A-A RADIATORS MANUFACTURED and repaired. Radiators of any make repaired and returned same day. We can make any style radiator and ship in three days. Sheppard Co., 1331 Jackson Blvd., Chicago.

AA1 AUTO LAMP REPAIRING

All Radiators Repaired by expert workmen. All work guaranteed by the Michaud Metal Works, 1615 Wabash Ave., Chicago. Tel. Cal. 5286; Auto. 67-337.

ALL KINDS OF AUTO RADIATORS, hoods, fenders and lamps, etc., rebuilt and repaired. Also general sheet metal work. Phone or mail order. L. Blumenfeld & Co., 1919 Wabash Ave., Chicago. Tel. Cal. 4583.

ARROW RADIATOR REPAIR CO.

1331 Wabash Ave., Chicago. Expert repair work on Radiators, Hoods, Fenders, Dashes, Tanks and Drip Pans. We guarantee all our work. Phone Cal. 1995.

CHICAGO MANUFACTURING COMPANY, 1466 Michigan Ave., Chicago. Manufacturers of Radiators, Hoods, Fenders and Tanks. New Cores placed in old radiators. First-class repairing. All work guaranteed.

ILLINOIS AUTO SHEET METAL WORKS

1559 Michigan Ave., Chicago. The leaders in the repairing and manufacturing of radiators, hoods, fenders, etc. A trial will convince you. Orders shipped 3 days after receipt. Phone Calumet 1191.

ONLY RADIATOR FACTORY IN NORTHWEST. Eleven years' knowing how. Why send your Radiator down East when you can ship it to us; save Time, Express, Freight, Money, and get best workmanship. Prices right. Make new Radiators; allow for old one.

Todd Manufacturing Co., 820 Mary Pl., Minneapolis, Minn.

RADIATOR AND ALL METAL REPAIRING QUICKLY DONE.

Repairs to Radiators, Hoods, Fenders, etc., our specialty. Best workmanship. If in a hurry for your car, try us. Quick and satisfactory service guaranteed.

Auto Combination Mfg. Co., 1467-69 Michigan Ave., Chicago. Phone Calumet 3433.

WANT YOU TO KNOW WE DO EXPERT repair on auto lamps, radiators, windshields, fenders and in fact all brass and sheet metal work, relative to automobile business; we also nickel plate or enamel the brass work on your auto if desired; reasonable prices in connection with first class work; our guarantee. "The Liberty Plating and Repair Works," 546 Liberty St., East, Savannah, Ga.

THE M. & L. AUTO SHEET METAL Works rebuild and repair radiators, hoods, fenders, tanks, lamps, etc. 1551 Michigan Ave., Chicago, Ill. Tel. Cal. 2348.

Ignition Repairing

IGNITION AND LIGHTING APPARATUS repaired successfully where others fail. Parts in stock for all makes. Send your next work to us and be convinced. Catalogue sent free. Pellet's Magneto Exchange, 1463 Michigan Ave., Chicago, Ill.

Rebuilding and Repairing

ANDRE G. CATELAIN Automobile Garage and General Machine Work For Foreign and American Cars Welding all kinds of metal Manufacturer Catelain Hose Coupling, 1446-8 Indiana Ave. Tel. Calumet 1187 Chicago.

BROKEN CYLINDERS AND CRANKCASES—Send them to be made good as new at fraction of replacement cost. Scored cylinders repaired, \$12. No new pistons and rings required because bore not enlarged. Where cylinders are worn (not scored from loose wrist pin) reboring is only remedy. We do it expertly. Write for complete information and estimates. Waterbury Welding Company, Waterbury, Conn.

CYLINDERS REGROUND AND FITTED with new pistons and rings from \$7 to \$11 per cylinder. Gear cutting in steel, brass, rawhide, fiber, etc. Send us your old parts and we will make you new ones like originals, often cheaper than you can get them from the manufacturer. The Crown Machine Shop, Crown Point, Ind.

CYLINDERS REBORED, PISTONS AND RINGS fitted; \$8.00 to \$12.00 per cyl.; gear cutting in nickel steel, rawhide, fiber, brass, etc. Crankshafts, connection rods, gear sets, axles, crankcases, reproduced like original; send broken or worn parts to go by. The Shop of Quality. McCadden Machine Works, St. Cloud, Minn.

AUTOMOBILE CYLINDERS REGROUND, new pistons and rings fitted. Garage Air Compressors. Cast Iron Brazing Co., Manchester, N. H.

CYLINDERS REGROUND and fitted with new pistons and rings for \$15 per cylinder. We make parts and cut gears of all kinds. Send us your old parts and we will repair or duplicate them in record time. Cracked cylinders, gear cases, etc., welded and made good as new. Aluminum, bronze and brass castings of every description. The Adapt Machinery Co., 1624 Wabash Ave., Chicago, Ill.

NOTICE—AUTOMOBILE AND GARAGE owners. Free expert advice on troubles, where and how to find them. Repair Parts. Old Models, where and how to get them at the Right Price. Engineering Specialist, Goshen, Ind. Inclose stamp for reply.

POWERFUL AND QUIETER MOTORS ARE guaranteed by us where we regrind your cylinders, with new pistons and rings to fit; the charge is \$10 complete per hole; accuracy guaranteed. Merritt Co., 311 West Fifty-ninth St., New York City.

WABASH AUTO CONSTRUCTION WORKS

1523 Wabash Ave., Chicago. The leaders in overhauling and repairing automobiles. Our plant is completely equipped with machinery and welding outfit. A trial will convince you. All work is guaranteed.

Telephone Calumet 670.

Tires

NEW TIRES

28x3, \$7.20; tube, \$2.40. 30x3, \$7.85; tube, \$2.50. 30x3½, \$11.00; tube, \$3.35. 32x3½, \$12.00; tube, \$3.55. 34x4, \$17.25; tubes, \$4.60. Tubes guaranteed; other sizes accordingly. Get price list, 10% with orders, balance C. O. D. Examination allowed. Para Auto Tire Co., 1419 Michigan Ave., Chicago.

TIRES, TUBES AND AUTO LAMPS

New and slightly used. Special price on all repair work. MONARCH TIRE AND REPAIR CO., 1151 Wabash Ave., Chicago. Phone Har. 1440.

800—TIRES—800

One-half price; new and slightly used; 1912 stock just received from manufacturers in Akron, Ohio. All the stock must be sold to make room.

Serlin Tire Co., 173 14th Place, Chicago. Phone, Canal 2191.

3,500 MILE GUARANTEED CASING AND tubes, 20% discount; new second casings, 40% off; also good used casings cheap; send for bulletin. Auto Tire Sales Co., 1346-48 Michigan Ave., Chicago.

Automobile Schools

AA1 IS HOW OUR STUDENTS STAND with auto owners. Our school is the oldest, best equipped, most practical and successful in America. Write, phone or call for particulars. Auto School of America, Dept. M, 1600 Mich. Ave., Chicago. Tel. 1038 Cal.

AUTOMOBILE INSTRUCTIONS

Send for catalogue of the best equipped and most prominent institution in the country. WOLVERINE AUTOMOBILE COLLEGE, 940-2 Jefferson Ave. Detroit, Mich.

AUTOMOBILE SCHOOL

If you only want to learn to drive a car or to take a car to pieces or to clean up dirty parts, don't come to my school. But if you want to learn the Automobile Construction in all its phases thoroughly, then come to the Reliable School. The F. E. Edwards Automobile School, 1427 Wabash Ave., Chicago.

GREER COLLEGE OF MOTORING

Opposite Coliseum, 1459 Wabash Ave., Chicago. A practical education; 100 automobiles, 2 entire floors, 8 instructors; day and evening classes. Free booklet. Phone Calumet 327.

\$35 PAYS FOR COMPLETE UNLIMITED course on automobiles. Actual repair work and road lessons daily. Best equipped school and shop in Chicago. Evening classes also. Call or write, 1454 S. Michigan Ave., Chicago. Academy of Automobile Engineering.

WANTED—400 MEN AT ONCE; EARN while you learn; oldest, first chartered in the United States; free employment bureau; no classes; open year round. Special short-time offer. Mack's Auto School, Salem, N. Y.

Welding

AMERICAN WELDING CO.

2637 Michigan Ave., Chicago. Autogenous welding of all metals, such as crankcases, cylinders, etc. We positively guarantee all work. Tel. Calumet 3563.

AUTOGENOUS WELDING

Automobile cylinders and crankcases a specialty. We guarantee the welds. C. Sorensen, 18 East 16th St., Chicago.

BRAZING AND WELDING CO.

of Chicago. All metals brazed and welded are guaranteed. Experts in aluminum welding. Send for circular on aluminum welding. 1615 Wabash Ave. Tel. Calumet 5286.

BROKEN CRANKSHAFTS, CRANKCASES, cylinders, flywheels, gear teeth, pistons, perfectly welded and machined, ready to replace. Scored cylinders made new. Booklet Atlas Welding Works, Rahway, N. J.

WELDING AND CUTTING OF METALS, automobile work a specialty; all kinds of broken machinery repaired; chassis lengthened and repaired; all kinds of brazing. Will cut designs out of steel plates. E. W. Soleau, 264 DeWitt Ave., Belleville, N. J.

WELDING

Cast iron, aluminum and all metals. National Welding & Mfg. Co., Inc., 523 Jackson Blvd., Chicago, Ill.

WE WELD AND ABSOLUTELY

Guarantee our welds to hold, cylinders (cracked in or outside), crankshafts, aluminum crankcases, transmission cases, housings, etc., by the Ox-weld process of welding and cutting metals. Estimates furnished for job or repair welding and cutting operations of all kinds. Ox-weld Acetylene Co., 37th St. and Jasper Pl., Chicago, Illinois. Down town receiving station, 557-561 W. Jackson Blvd.

WELDING—CYLINDER CRANK CASE AND Crank Shaft. Welded cylinders rebored \$7.00 to \$11.00 a cylinder, including piston, 8 rings. Sterling Engine Company, 331-333 S. Clinton St., Chicago, Ill.

Garages

PORTABLE AUTOMOBILE GARAGES, portable summer cottages, all descriptions. Alfio. Cons. Co., 3652 Armitage Ave., Chicago.

Patent Attorneys

ATTENTION—PATENT YOUR INVENTION Free search and opinion. Send for inventor's Primer, free. Milo B. Stevens & Co., 812 S. Dearborn St., Chicago. Established 1864. Main office, Washington.

C. L. PARKER, PATENT ATTORNEY, Formerly member Examining Corps, U. S. Patent Office. 960 G St., Washington, D. C. Pamphlet of instruction sent upon request.

IMPROVEMENTS IN AUTOMOBILES AND parts wanted; send sketch. H. J. Sanders, 29 Crilly Building, Chicago, Ill.

Patterns

HIGH GRADE AUTOMOBILE AND MA-chine patterns; right price and prompt delivery guaranteed. W. J. Nobach Pattern Works, 622 W. Jackson Blvd., Chicago.

Magnetos

MAGNETOS Repaired, remagnetized; prompt service on all makes. Get our exchange proposition on new K-W for old equipment. Spark Coil, Storage Battery and Carburetor Repairs. Northwestern distributors. K-W magnetos, Schebler carburetors, Vesta lighting equipments. Reinhard Brothers Co., Successors to Hollis Electric Co., Minneapolis, Minn.

Insurance

AUTOMOBILES INSURED AGAINST FIRE, theft, collision and liability. Covers anywhere. Old line company—lowest rates. Alfion E. Bahr, 1929 Insurance Exchange, Chicago.

Agency Wanted**AGENCY WANTED**

One good line by manufacturers' representative covering Auto and Hardware jobbing trade of entire southern states and Texas.

A-1 references.

Reply to Box D 311, c/o Motor Age.

Business Opportunities

FOR RENT—TWO FLOORS, 25,000 SQ. FT., corner Automobile Building. Low rent. Address Jos. Libal, owner, 3145-52 North Halsted St., Chicago, Ill.

FOR SALE—FULLY EQUIPPED AUTO RE-pair shop in city of 45,000. Good reason for selling. Legal News, Topeka, Kansas.

FOR SALE OR RENT—GARAGE AND livery in western Minnesota town of 2,000 inhabitants. Building 40x60; lot 40x160. Garage fully equipped. Turning lathe, two drill presses, emery stand, three steam vulcanizers. The only tire plant in town. One five passenger touring; run 2,000 miles. Best of reason for selling. A snap for some one. For particulars address Box D 299, c/o Motor Age.

GARAGE FOR SALE—ONLY GARAGE IN county of over 30,000 inhabitants. Cars used the year round. Conveniently located in two-story stone building, with car elevator and modern equipment. Reason for selling: I have contracted to sell 30 Fords, 10 Overlands, 10 Buicks and 3 Cadillacs in this territory and want to devote all of my time to selling. Working six mechanics all the time. \$5,000 will buy the business. O. O. Fisher, Marianna, Fla.

MECHANIC, MANAGER OR SALESMAN who can purchase quarter interest for \$3,000 in piston ring and cylinder grinding company in New York City, incorporated under laws of New York State; must be active; salary; rare opportunity; field and orders unlimited; factory working night and day; best references required. Address Box D 316, c/o Motor Age.

PLANT FOR SALE CHEAP. Suitable for auto bodies (especially Limousine) and accessories. Power, lights, water, dry kilns, sprinklers, side tracks, abundant storage. The A. J. Phillips Co., Fenton, Mich.

RARE BUSINESS OPPORTUNITY

Will sell controlling interest in a good, live automobile business in a southern city of 45,000 inhabitants. Been in business about a year, doing well and have bright prospects. Have a new fireproof garage, 100x132. A large well-equipped repair shop. Agent for a high-class, a medium and a cheap car, three of the very best makes on the market. Also doing a large accessory business.

Reason for selling: party owning controlling interest has other business which requires all of his time. This is an unusual opportunity to get control of a good established business.

Address

Box D 288, c/o Motor Age, Chicago, Ill.

Automobile Books and Maps for Motorists

AUTO OWNERS AND MECHANICS—SEND one dollar for thirty-seven independent causes for miss in the cylinder and how to locate them quickly. W. H. Whitney, Maryville, Mo.

A. L. DYKE'S AUTO INSTRUCTION—A new idea of instructing you to run and repair automobiles at home with working models (from London), charts, etc. Indorsed by Duryea, Oldfield, Splittorf. Send for free 32-page illustrated and interesting book. A. L. Dyke, Box 16, Roe Bldg., St. Louis, Mo.

"FORD MODEL T REFERENCE BOOK" was written by an expert, being prompted by the numerous inquiries by Ford owners in the "Trouble Departments" of Auto Journals. It answers every question that can arise regarding Ford Model T and covers its complete care and repair. Write for full descriptive circular or sent postpaid for \$1.00. Ford Reference Book Co., 57 W. 125th St., New York.

GAS ENGINE TROUBLES AND INSTAL-lation. Cloth, \$1.00; flexible leather, \$1.50. Automobile Troubles and How to Remedy Them. Cloth, \$1.00; leather, \$1.50. Ten other practical and reliable mechanical books. Send for circular.

Charles C. Thompson Co., 1128 S. Wabash Ave., Chicago.

PARTS AND ACCESSORY MAKERS The motorcycle field is well worth your attention: 75,000 new machines in 1912. Leading medium Motorcycle illustrated, 51 Chambers St., New York City. Paid circulation over 8,600.

SPEED SPEED SPEED

Speed. Written by a racing driver gives you the "dope" for making your car "fast." Postpaid upon receipt of \$1.00. Speed Publishing Co., 207 Bell Block, Cincinnati, O.

Mailing Lists

AUTO LISTS—OWNERS, ETC., OF ANY State. S. H. Carroll, Jr., Albany, N. Y.

AUTOMOBILE MAILING LISTS

We can furnish 472,000 Automobile Owners, segregated by states, \$2.00 per thousand, in lots of 1,000 to 10,000; over that, \$1.50 per thousand. Also Dealers, Garages, Repair Men, Manufacturers, etc. Ask for our "Silent Salesman," No. 53, showing 2,000 other classified lists. It's free.

TRADE CIRCULAR ADDRESSING CO., 166½ W. Adams St., Chicago.

Phone Franklin 1182. Established 1880.

MAILING LISTS AND STATISTICS.

Owners or dealers; any state, county, city; weekly and monthly supplements at lowest prices. Special lists of Electrics, Trucks, Fords, Studebaker, Overland, etc.

MOTOR LIST CO. OF AMERICA, 220 News Arcade. Des Moines, Iowa.

NEW ENGLAND AUTO LIST AND TOUR-ist includes weekly list of all N. E. Auto Owners, Garages, Dealers, etc., with maps. Selected N. E. routes and motor news. \$10.00 yearly. 138 Pearl St., Boston, Mas.

Miscellaneous

DETECTIVES WANTED—YOUNG MEN to operate in own locality, secret service work. Experience unnecessary. Enclose stamp for particulars. Universal Detective Agency, 304 Concord Bldg., Okla. City, Okla.

MANUFACTURING.

Our facilities cover drop forgings, stamping, machining, finishing and assembling. Correspondence solicited. Century Telephone Construction Co., 1738 Elmwood Ave., Buffalo, N. Y.

WANTED—A THREE-TON FREIGHT ELE-vator. Must be in good condition, with large platform for Motor Cars. Address, 173 Lock Box, Green Bay, Wis.

Hotels

HOTEL WYCHMERE, EUROPEAN, Indiana Ave. and Eighteenth St., Chicago. In the very center of automobile district; 75c to \$1.50 per day; with bath, \$1.00 to \$2.00. Clean, comfortable rooms. Fine 40c table d'hote. Take South Side trolley to door.

Automobile School

F. E. EDWARDS.

Automobile School and College of Motoring 1427 Wabash Ave., Chicago

Write for Particulars

THE RELIABLE SCHOOL

WANTED

State distributors, exclusive rights, excellent proposition.

STURDY MFG. CO.

2639 Michigan Ave. CHICAGO

ESTABLISHED 1848

SCHRADER

UNIVERSAL VALVES

TRADE MARK REGISTERED APRIL 30, 1893.

The Standard American Valves for Automobile, Bicycle & Vehicle Tires

Manufactured by

A. SCHRADER'S SONS, INC.

28-32 Base Street New York, U. S. A.

NOTICE!

The March 20th issue of MOTOR AGE advertised a mileage contest of Ajax Tires offering \$5,000 in prizes.

This advertisement stated that in case of ties lots would be drawn to determine the disposition of prizes.

This statement is here withdrawn.

In order to eliminate from the contest every possible element of chance, in case of a tie, the prizes will be equally divided between the tying contestants.

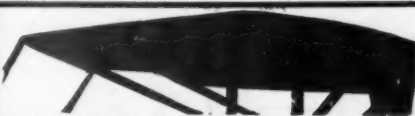


Abbott-Detroit

"The demand of the day is that an organization shall be judged by its product and not by what it claims for itself." Keep this in mind when you examine these 1913 models

MODELS AND PRICES	
30-40 Fore-door Roadster, 116-inch wheel base	\$1700
34-40 5-passenger, Fore-Door Touring Car	\$1700
44-50 5-passenger, Fore-Door Demi-Tonneau	\$1975
44-50 7-passenger, Fore-Door Touring Car	\$2000
44-50 Battleship Roadster, 121-inch wheel base	\$2150
44-50 7-passenger, Fore-Door Limousine	\$3050

Advance Catalog on Request
ABBOTT MOTOR CO.
 808 WATERLOO STREET DETROIT, MICH.
 "Built for Permanence" "Guaranteed for Life"



AUTOMOBILE TOPS Write for catalogue and prices. We can save you money.
BUOB & SCHEU
 Court and Broadway, Cincinnati, Ohio



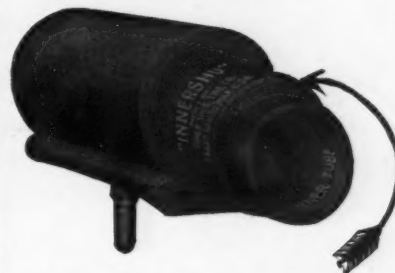
The "Yankee" Silent Muffler has no complicated parts to become clogged. No back pressure, and silent. Made in various sizes. Write for free catalog.
 Manufactured by
THE "YANKEE" CO., Utica, N. Y., U. S. A.

NEW CATALOG 300 PAGES
 Now Ready

**MOTOR CAR
 MOTOR CYCLE
 MACHINISTS'
 BICYCLE** **SUPPLIES**
 and Bicycles

**WHOLESALE ONLY DEALERS GET
 YOUR NAME IN**
MOTOR CAR SUPPLY COMPANY
 1451-1453-1455 Michigan Ave., Chicago

The "INNERSHU"



A Tire Reinforcement
 that is

GUARANTEED

Ask Any User

Made of the best, is the best, and recognized the country over as the one that makes good.

INNER SHOE TIRE CO.
 GRAND RAPIDS, MICH.



Borland Electrics

Agency territory is now being offered to those reputable and well-equipped dealers who are as particular about selling the best, as we are about making it.

The Borland-Grannis Co.
 EXECUTIVE OFFICES AND FACTORY
 310 East Huron Street
 CHICAGO

**THE LONG
 HORN**

\$18

The Hand
 Actuated
 Warning
 Signal.

It Never Fails

THE G. PIEL CO., Long Island City, N. Y.

L.C. CHASE & CO.

MANUFACTURERS OF
**Auto Top and Slip
 Cover Materials
 of all descriptions**

Boston New York Chicago San Francisco



**R.I.V. BALL
 BEARINGS**

FEPS CARBURETOR "A Giant in Power — A Miser in Fuel"
 25% to 50% more mileage
 Write for illustrated, descriptive booklet.
Schoen Jackson Company, Media, Pa.

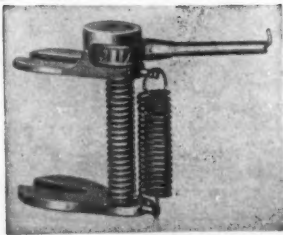
4 in 1 Valve Tap and Die

A tool for threading inside and outside of tire valves, mill for smoothing off end, key for removing and replacing insides. Sent to any part of U. S. upon receipt of 25c. Special price to dealers and jobbers in quantities. Dealers—Send your name for our 1913 Auto Supply Catalogue.

CHICAGO AUTOMOBILE SUPPLY HOUSE
 1355 So. Michigan Blvd.

**OAKES
 RADIATOR
 FANS**

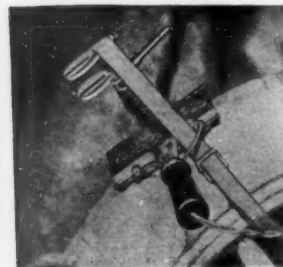
The Oakes Co. Indianapolis Ind.



As a Spring Stretcher



Used to Patch a Tire



As a Vulcanizing Clamp

A HAND VISE—
A CLAMP
A DRILL JIG—
A VALVE LIFTER—
A SPRING STRETCHER

ALL IN ONE TOOL

Every repair-man, chauffeur, car owner and factory mechanic will find use many times a day for a

Morgan Utility Tool

It is the only valve lifter that will hold the load both ways. It can't slip and pinch your fingers. It pays for itself in the time it saves you looking about the shop for different tools. Every motorist should carry one in his tool box. Lasts a lifetime.

Price \$2.00

At all jobbers and dealers or sent direct on receipt of price, plus 16 cents to cover postage.

MORGAN MFG. COMPANY
Fir Street Newport, R. I.

Repairmen! Overhauling Time Is Here

Perhaps you could do twice as much work this spring if you could handle it. At any rate, you could get out the work you have got about twice as fast if you used a

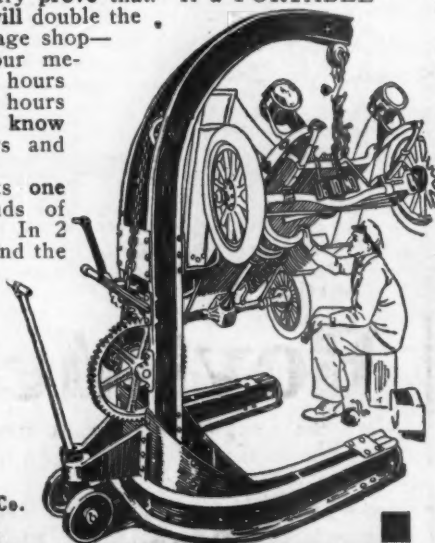
Portable Steel Garage Crane

The experience of hundreds of garage and repairmen throughout the country prove that. If a PORTABLE GARAGE CRANE will double the capacity of your garage shop—if it will permit your mechanics to do in 2 hours what formerly took 4 hours to do, you want to know it. It means dollars and cents to you.

This crane permits one man to do all kinds of work around a car. In 2 minutes he can suspend the heaviest car made. Unaided he can make tire changes—adjustments—take out a motor or lift a body.

Equipped with roller bearing wheels. All structural parts steel. Securely double-locked. Built in 3 sizes. Write for Prices

Lafayette Engineering Co.
LaFayette, Indiana



Index to Advertisements

A

Abbott Motor Co. 109
Acheson Graphite Co., International 101
Aermore Mfg. Co. 96
Aircase Tire Filler Co. 101
Ajax-Grieb Rubber Co. 99
Albany Lubricating Co. 61
American Ball Bearing Co. Cover
American Motors Co. 85
Ames Motor Car Co. 98
Apple Electric Co. 66
Approved Auto Specialties Co. 86
Atlas Auto Supply Co. 88
Atterbury Motor Car Co. 78
Atwater Kent Mfg. Works... 60
Auburn Automobile Co. 100
Auburn Auto Pump Co. 102
Automobile Equipment Co. 90
Automobile Supply Mfg. Co. 101

B

Baldwin Chain & Mfg. Co. 79
Barthel & Daly 89
Beaver Motor Mfg. Co. 100
Beckley-Ralston Co. 101
Borland-Grannis, The, Co. 109
Bosch Magneto Co. 77
Bowser, S. F., & Co. 80
Braender Rubber & Tire Co. 97
Bretz, J. S., Co. 71
Bricton Mfg. Co. 87
Bridgeport Brass Co. 83
Briggs-Detroit Co. 85
Bryan Electric Co. 76
Buckeye Mfg. Co. 89
Buda Co. 88
Buffalo Electric Vehicle Co. 91
Buob & Scheu 109
Byrne, Kingston & Co. 84

C

Cameron Mfg. Co. 87
Cartercar Co. 90
Chase, L. C., & Co. 109
Chase Motor Truck Co. 97
Chicago Automobile Supply House 109
Classified. 103-104-105-106-107-108
Cleveland-Canton Spring Co. 94
Cole Motor Car Co. 88
Colorado Tire & Leather Co. 81
Connecticut Shock Absorber Co. 84
Continental Motor Mfg. Co. 102
Corcoran Lamp Co. 90
Covert Motor Vehicle Co. 85
Croxtan Motor Car Co. 80
Cullman Wheel Co. 101
Cutting Motor Car Co. 94

D

Dart Motor Mfg. Co. 94
Dean Electric Co. 83
De Soto Motor Car Co. 88
Detroit Trailer Co. 74
Diamond Rubber Co. of N. Y. 99
Dixon, Joseph, Crucible Co. 97
Dorris Motor Car Co. 89
Double-Fabric Tire Co. 87

E

Eagle Oil & Supply Co. 87
Eisemann Magneto Co. 91
Electrical Specialties Mfg. Co. 76
Empire Automobile Co. 99

F

F. I. A. T. 98
Federal Rubber Mfg. Co. 102
Ford Motor Co. 97
Franklin Automobile Co. 97
Frontier Specialty Co. 80

G

Gabriel Horn Mfg. Co. 75
Gibney, Jas. L., & Bros. 90
Gilbert Mfg. Co. 86
Gilmer, J. Walker, Jr. 83
Golde-Patent Mfg. Co. 89
Goodyear Tire & Rubber Co. 96
Gramm-Bernstein Co. 87
Grand Rapids Motor Truck Co. 89
Gray & Davis 99
Great Western Automobile Co. 93
Grossman, Emil, Co. 86
Guide Motor Lamp Mfg. Co. 74

H

Halliwel Co. 87
Ham, C. T., Mfg. Co. 101
Hartford Suspension Co. 2
Haynes Automobile Co. Cover
Haywood Tire & Equipment Co. 91
Heinze Electric Co. 102
Henderson Motor Car Co. 92
Herreshoff Motor Co. 101
Herz & Co. 82
Hess-Bright Mfg. Co. 77
Hess Spring & Axle Co. 93
Hoffecker Co. 68-69
Holley Bros. Co. 51
Holtzer-Cabot Electric Co. 79
Horton, F. L., Mfg. Co. 97
Hotel La Salle 81
Hotel Woodstock 96
Houk, Geo. W., Co. 89
Hoyt Electrical Inst. Co. 111
Hupp Motor Car Co. 96
Hyatt Roller Bearing Co. 100

I

Ideal Motor Car Co. 86
Ideal Steel Wheel Co. 94
Imperial Automobile Co. 97
Indian Refining Co. 85
Ingersoll-Rand Co. 99
Inner Shoe Tire Co. 109
Inter-State Automobile Co. 91

J

Jackson Automobile Co. 97
Jacobson Machine Mfg. Co. 91
Jeffery-Dewitt Co. 63
Jenkins Mfg. Co. 102
Johns, H. W., -Manville Co. 81
Johnson Service Co. 76
Jones Speedometer, The. 83

K

K-W Ignition Co. 78
Kamlee Co. 79
Keeton Motor Co. 86
Kellogg Mfg. Co. 92
Kimball Tire Case Co. 94
Kinsey Mfg. Co. 100
Kissel Motor Car Co. 67
Kline Motor Car Corp. 100
Knox Automobile Co. 101
Kokomo Rubber Co. 76

Index to Advertisements

MARTYRDOM

in a good cause is excellent

But martyrdom to lack of research is another matter.
The modern non-skid preserves tires—it does not damage them. Likewise it prevents punctures.

Double Grip
Woodworth Treads

stay on the tires from December to April. They save both danger and trouble, and they more than pay for themselves in added tire life.

Write today to us or to our nearest distributor.

LEATHER TIRE GOODS CO.

Niagara Falls, New York

(Distributors: D. A. Falkenburg & Co.
1210 Webster Ave., Chicago, Ill.)



Good
Agents
Wanted
for
Unoccu-
pied
Territory



Type I-F Ammeter

METERS are as essentially a part of the electric lighting equipment as gauges are a part of the steam boiler, and who would think of operating even a small steam heater without suitable gauges?

True, the hazard is greater with the boiler, but the safety valve takes care of that.

By means of the gauges you are enabled to operate your boiler more intelligently and increase its efficiency.

If a manufacturer tells you that meters are unnecessary with his lighting equipment, he deceives himself. If you rely on his statement, you deceive yourself.

Hoyt Meters

are the accepted standard in automobile lighting.

ASK FOR BULLETIN 7

Hoyt Electrical Instrument Works
Penacook, N. H.

L

LaFayette Engineering Co.... 110
Lauth-Juergens Motor Car Co. 98
Leather Tire Goods Co..... 111
Locomobile Co. of America... 1
Lovell-McConnell Mfg. Co... 47
Lozier Motor Co..... 96

M

McCue Co..... 93
McFarlan Motor Car Co..... 88
Marathon Motor Works..... 91
Marburg Bros..... 94
Marion Motor Car Co..... 85
Maxwell Motor Co.....
.....back cover-54-55
Mayer Carburetor Co..... 96
Mayo Mfg. Co..... 78
Mercer Automobile Co..... 89
Metz Co..... 96
Mezger, C. A., Inc..... 70
Michener, E. S..... 90
Model Gas Engine Works.... 92
Moline Automobile Co..... 52
Morgan Mfg. Co..... 110
Morrison-Ricker Mfg. Co.... 82
Mosler, A. R., & Co..... 95
Motometer, The, Co..... 99
Motor Car Equipment Co.... 87
Motor Car Mfg. Co..... 102
Motor Car Supply Co..... 109
Mott Wheel Works..... 100
Mutt, L. J., Co..... 101

N

National Motor Vehicle Co... 48
National Rubber Co..... 83
New Departure Mfg. Co.... 73
New Process Gear Corp..... 94
New York & New Jersey Lubricant Co..... 98
Nordyke & Marmon Co..... 92
Norma, The, Co. of America. 73
North East Electric Co..... 101
Northwestern Chemical Co... 82
Nyberg Automobile Works... 98

O

Oakes Co..... 109
Oakes & Dow..... 79
Oakland Motor Car Co..... 86
Owen, R. M., & Co..... 62

P

Packard Electric Co..... 84
Packard Motor Car Co..... 112
Paige-Detroit Motor Car Co. 85
Parish & Bingham Co..... 102
Peacock, Clarence N., & Co. 99
Pennsylvania Rubber Co.... 93
Perfection Spring Co..... 101
Piel, G., Co..... 109
Pilot Car Sales Co..... 96
Pittsfield Spark Coil Co.... 89
Premier Motor Mfg. Co..... 83
Prest-O-Lite Co..... 88
Prosser, Thos., & Son..... 102
Pullman Motor Car Co..... 93

R

R. C. H. Corp..... 72
R. I. V. Co..... 109
Rajah Auto Supply Co..... 84
Rayfield Carburetor..... 91
Remy Electric Co..... 59
Republic Rubber Co..... 95

Rhineland Machine Works

Co. 102
Robbins, Irvin, & Co..... 95
Royal Equipment Co..... 84
Rub-On Mfg. Co..... 82
Rutenber Motor Co..... 95

S

Salisbury Wheel & Mfg. Co.. 92
Sanford Motor Truck Co.... 83
Schacht Motor Car Co..... 101
Schoen-Jackson Co..... 109
Schrader's, A., Sons..... 108
Searchlight Gas Co..... 90
Shaler, C. A., Co..... 84
Sheldon Axle Co..... 88
Sparks-Withington Co..... 91
Spicer Mfg. Co..... 98
Splittorf Electrical Co..... 92
Standard, The, Co..... 92
Standard Gauge Steel Co.... 100
Standard Oil Co..... 57
Standard Welding Co..... 93
Standard Woven Fabric Co.. 95
Star Ball Retainer Co..... 95
Staver Carriage Co..... 95
Stromberg Motor Devices Co. 45
Studebaker Corporation..... 87
Sturdy Mfg. Co..... 108
Suspension Roller Bearing Co. 100
Swinehart Tire & Rubber Co. 90

T

Times Square Auto Co..... 90
Timken Roller Bearing Co... 58
Timken-Detroit Axle Co.... 58
Trabold Truck Mfg. Co..... 98
Troy Carriage Sunshade Co.. 102
Tuthill Spring Co..... 102
Twentieth Century Tire Protector Co..... 88
Twitchell Gauge Co..... 93

U

United States Light & Heating Co..... 92
United States Tire Co..... 98
Universal Mfg. Co..... 86

V

Vacuum Oil Co..... 50
Veeder Mfg. Co..... 78

W

Walpole Tire & Rubber Co... 74
Ward Leonard Electric Co... 56
Warner Auto-Meter Factory. 85
Warner Gear Co..... 75
Warner Mfg. Co..... 93
Weed Chain Tire Grip Co.... 95
Wells, R. C., Mfg. Co..... 86
Westinghouse Electric & Mfg. Co. 65
Weston Mott Co..... 94
Wheeler & Schebler..... 46
Wheel of Fortune Corp..... 53
Whitney Mfg. Co..... 3
Willard Storage Battery Co.. 49
Willys-Overland Co..... 64
Winton Motor Car Co..... 84
Wisconsin Motor Mfg. Co.... 84

Y

Yankee Co..... 109

Z

Zenith Carburetor Co..... 85

When Writing to Advertisers, Please Mention Motor Age.

HAS RUN THREE YEARS AND NEVER MISSED A TRIP



Two-ton Chassis	-	-	\$2,800
Three-ton Chassis	-	-	3,400
Five-ton Chassis	-	-	4,500

f. o. b. Detroit

Arbuckles & Company of Pittsburgh purchased their first Packard truck three years ago. The truck gave better service than horses and effected a saving of \$4.67 a day as shown by complete cost records, covering an entire year. The second Packard truck was purchased in December, 1910. Neither of these vehicles has ever missed a trip.

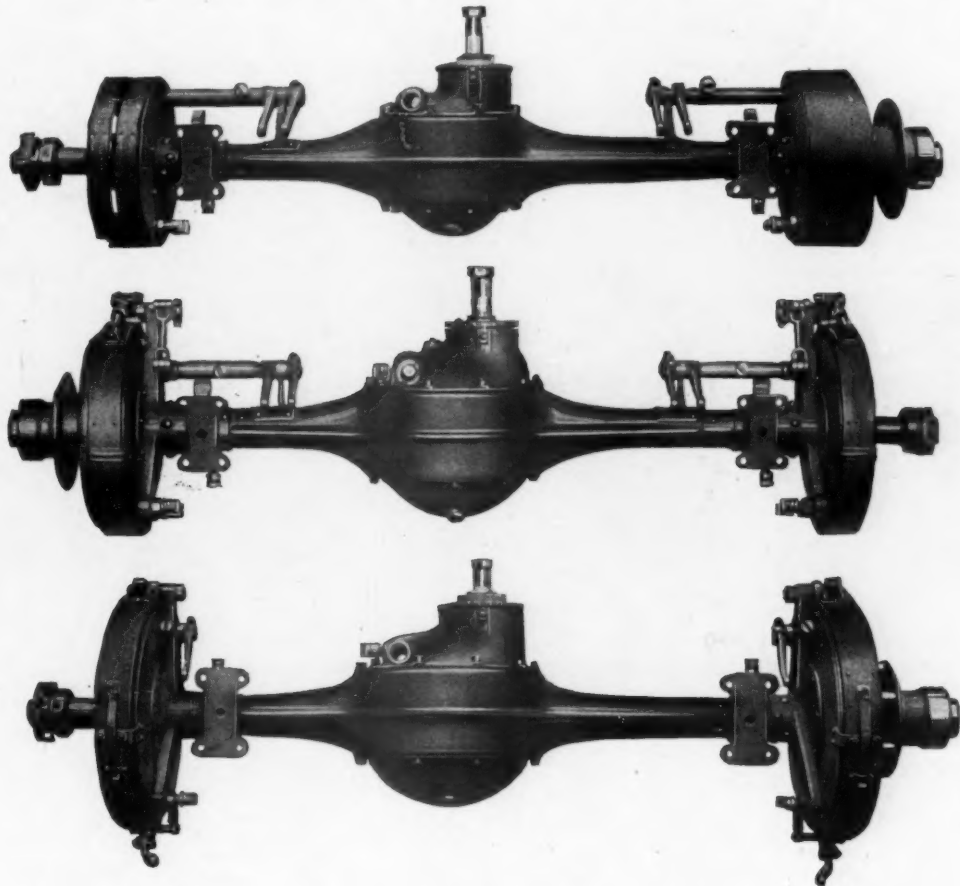
**Eighty-five grocers in forty-six
cities are using 141 Packard trucks**

We have been using a Packard truck since December, 1910. We consider the Packard the best motor vehicle on the market.

B. A. RAILTON & COMPANY
823 West Randolph Street, Chicago

Ask the man who owns one
Packard Motor Car Company, Detroit

American Axles



Bevel Drive

TO SUPPLY correctly proportioned axles for high grade motor cars of various weights, *American* full floating bevel drive rear axles are made in three sizes, known respectively as Type 46, 43 and 50.

ALL THREE types possess the same general principles of design and perfection of workmanship which characterize our axles, yet each is constructed to meet the peculiar requirements of the car for which it is intended.

American Axles cannot be excelled. Whether for gasoline or electric cars, they assure high efficiency and the smooth and quiet running which is so desirable and even necessary in axles for cars of the better class.

The American Ball-Bearing Co., Cleveland, Ohio